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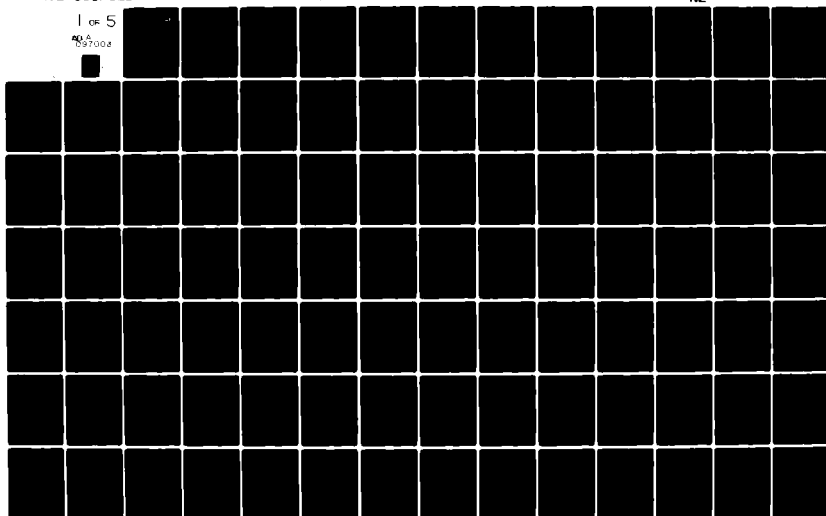
ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA PA DIV OF--ETC F/6 6/6  
FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDAE) OF THE UPPER--ETC(U)  
SEP 80 S L FULLER  
79-24F-VOL-2

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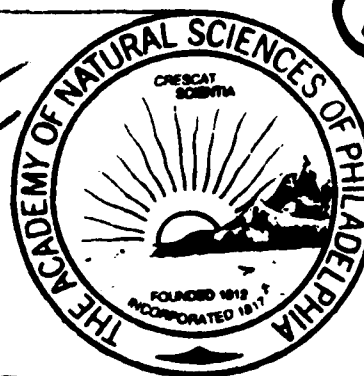
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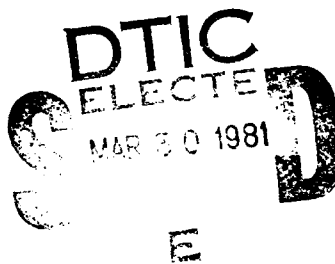
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LEVEL III



FINAL REPORT

Freshwater Mussels (Mollusca: Bivalvia: Unionidae)  
of the Upper Mississippi River  
Observations at Selected Sites within the 9-Foot  
Navigation Channel Project for the St. Paul District,  
United States Army Corps of Engineers,  
1977-1979



Volume II: Appendices

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Samuel L. H. / Fuller

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Academy of Natural Sciences of Philadelphia

Division of Limnology and Ecology

19th and the Parkway

Philadelphia, PA 19103

September 10, 1980

112351

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Black Sandshell

*Ligumia recta* (Lamarck)



## REPORT ORGANIZATION AND AVAILABILITY

### Report Organization

Under United States Army Corps of Engineers Contract No. DACW 57-78-C-0133, this report is issued in two volumes: Volume I, Text, and Volume II, Appendices. Several sections are included in both parts: Title Page; Report Organization and Availability (the present section); Table of Contents; Correlation of Rivers, Pools, and Sites with Exhibits; and Additions and Corrections. Several other sections occur only in Volume I: Bibliography, Glossary, and Index. The Bibliography covers the entire report; the other two sections, Volume I only. The Glossary is essentially restricted to Volume I because the terminology used only in Appendix E is defined in its introduction.

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# CORRELATION OF RIVERS, POOLS, AND SITES WITH EXHIBITS

The Site exhibits, in Appendix B, portray the collecting location, date(s) and effort for each Site. The Taxa exhibits, in Appendix C, specify which mussel taxa were found at each site, pool, and river in the present study and in other studies. The Map exhibits, in Appendix D, locate collection Sites and mussel beds on maps and/or navigation charts of the study area.

| <u>Site Number and Name</u>              | <u>Exhibit Number</u> |             |               |
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| <u>Site Number and Name</u>                                  | <u>Exhibit Number</u> |             |               |
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| <u>Site Number and Name</u>                       | <u>Exhibit Number</u> |             |                  |
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| <u>Site Number and Name</u>                            | <u>Exhibit Number</u> |             |               |
|--|-----------------------|-------------|---------------|
|  | <u>Sites</u>          | <u>Taxa</u> | <u>Map(s)</u> |
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| <u>Site Number and Name</u>                            | <u>Exhibit Number</u> |             |               |
|--|-----------------------|-------------|---------------|
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| 78. Head of Twin Island Bank Repair                    | 68                    | 172         | 205, 240      |
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| 81. DeSoto   | 71                    | 175         | 205, 242      |
| 82. Above Indian Camp Light                            | 72                    | 176         | 205, 243      |
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| <u>Site Number and Name</u>          | <u>Exhibit Number</u> |             |              |
|--------------------------------------|-----------------------|-------------|--------------|
|                                      | <u>Sites</u>          | <u>Taxa</u> | <u>Map's</u> |
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APPENDICES

## Appendix A

### Classification and Nomenclature of Mussels and Glochidial Hosts

This Appendix provides classifications and scientific and common names for Upper Mississippi River mussels and known hosts of their glochidia.

Exhibit 1a

Systematic List of Mussels with Their Common Names

In the following phylogenetic list of known Upper Mississippi River freshwater mussels, family-group and tribal taxa are those of Davis and Fuller (1980), and the suprafamilial classification is Newell's (1965). The common names are those used by Fuller (1978b).

- Phylum MOLLUSCA
- Class Bivalvia
- Subclass Palaeoheterodonta
- Order Unionoida
- Family Unionidae
- Subfamily Margaritiferinae
- Cumberlandia monodonta* (Say), Spectacle Case
- Subfamily Lampsilinae
- Tribe Amblemini
- Quadrula* (*Orthonymus*) *metanevra* (Rafinesque), Monkeyface
- Q. fragosa* (Conrad), False Mapleleaf
- Q. (Q.) quadrula* Rafinesque, Mapleleaf
- Q. (Bullata) nodulata* (Rafinesque), Wartyback
- Q. (B.) pustulosa* (Lea), Pimpleback
- Tritogonia verrucosa* (Rafinesque), Buckhorn
- Cyclonaias tuberculata* (Rafinesque), Purple Pimpleback
- Fusconaia flava* (Rafinesque), Pigtoe
- F. ebena* (Lea), Ebony Shell
- Megalonaias gigantea* (Barnes), Washboard
- Amblema plicata* (Say), Threeridge
- Tribe Elliptionini
- Plethobasus cyphus* (Rafinesque), Bullhead
- Pleurobema rubrum* (Rafinesque), Pink Pigtoe
- P. sintoxia* (Rafinesque), Round Pigtoe
- Elliptio crassidens* (Lamarck), Elephant Ear
- E. dilatata* (Rafinesque), Spike
- Tribe Lampsilini
- "Subtribe Mesogenae"
- Obliquaria reflexa* Rafinesque, Threehorn
- "Subtribe Heterogenae"
- Proptera alata* (Say), Pink Heelsplitter
- P. laevissima* (Lea), Pink Papershell
- P. purpurata* (Lamarck), Purple Pocketbook
- P. capax* (Green), Fat Pocketbook
- Leptodea fragilis* (Rafinesque), Fragile Papershell
- L. leptodon* (Rafinesque), Narrow Papershell
- Ellipsaria lineolata* (Rafinesque), Butterfly
- Truncilla truncata* (Rafinesque), Deertoe
- T. donaciformis* (Lea), Fawnfoot
- Obovaria olivaria* (Rafinesque), Hickorynut
- Actinonaias carinata* (Barnes), Mucket
- A. ellipsiformis* (Conrad), Ellipse

*Ligumia reata* (Lamarck), Black Sandshell  
*L. subrostrata* (Say), Western Pondmussel  
*Carunculina parva* (Barnes), Lilliput  
*Lampsilis teres* (Rafinesque), Yellow Sandshell  
*L. higginsi* (Lea), Higgins' Eye  
*L. radiata siliquoides* (Barnes), Fat Mucket  
*L. ovata ventricosa* (Barnes), Pocketbook  
*Plagiola* (*Truncillopsis*) *triquetra* (Rafinesque), Snuffbox

Subfamily Anodontinae

*Anodonta confragosa* (Say), Rockshell  
*Lasmigona* (*Pterosyna*) *complanata* (Barnes), White Heelsplitter  
*L. (L.) costata* (Rafinesque), Fluted Shell  
*L. (Platynaias) compressa* (Lea), Creek Heelsplitter  
*Alasmidonta* (*Decurambis*) *marginata* (Say), Elktoe  
*A. (Pressodon) viridis* (Rafinesque), Slippershell  
*Simpsoniconcha ambigua* (Say), Salamander Mussel  
*Anodontoides ferussacianus* (Lea), Cylinder  
*Anodonta* (*Utterbackia*) *suborbiculata* Say, Flat Floater  
*A. (U.) imbecillis* Say, Paper Floater  
*A. (Pyganodon) grandis* Say, Giant Floater  
*Strophitus undulatus* (Say), Strange Floater

NOTE: Davis and Fuller (1980) favor the following adjustments in nomenclature:

1. *Cumberlandia* is genetically no farther from *Margaritifera* than the members of that genus are from one another. Suggested result: *Margaritifera monodonta*.

2. *Quadrula* (*Orthonymus*) *metanevra* is genetically so far from other *Quadrula* that raising *Orthonymus* to generic status is warranted. Suggested result: *Orthonymus metanevrus*.

3. *Megalonaias* is genetically very closely allied to *Amblema* (and *Plectomerus*). Suggested result: *Amblema gigantea*.

Buchanan (1979a) recently placed *Actinonaias ellipsiformis* in *Venustaconcha*. Regardless of whether or not this particular adjustment proves warranted, the correct genus for this species has not been demonstrated to the Principal Investigator's satisfaction.



Exhibit 1b

Systematic List of Fishes (with Their Common Names)  
that Host Glochidia of UMR Mussels

The following list provides the classification and standardized scientific and common names according to Bailey et al. (1970) of fishes that have been identified and/or implicated as glochidial hosts of UMR freshwater mussels. Names at and above family rank are in a phylogenetic sequence, but genera and species names are alphabetized.

Omitted from the list is the one relevant host that is not a fish: *Necturus m. maculosus* (Rafinesque), the Mudpuppy, which is a salamander (Vertebrata: Amphibia).

Phylum CHORDATA  
Subphylum Vertebrata  
Class Agnatha  
Order Petromyzontiformes  
Family Petromyzontidae  
*Petromyzon marinus* Linnaeus, Sea Lamprey  
Class Osteichthyes  
Order Acipenseriformes  
Family Acipenseridae  
*Scaphirhynchus platyrhynchus* (Rafinesque) Shovelnose Sturgeon  
Order Semionotiformes  
Family Lepisosteidae  
*Lepisosteus osseus* (Linnaeus), Longnose Gar  
*L. platostomus* Rafinesque, Shortnose Gar  
*L. spatula* Lacépède, Alligator Gar  
Order AmiiFormes  
Family Amiidae  
*Amia calva* Linnaeus, Bowfin  
Order Anguilliformes  
Family Anguillidae  
*Anguilla rostrata* (Lesueur), American Eel  
Order Clupeiformes  
Family Clupeidae  
*Alosa chrysochloris* (Rafinesque), Skipjack Herring  
*Dorosoma cepedianum* (Lesueur), Gizzard Shad  
Order Salmoniformes  
Family Esocidae  
*Esox lucius* Linnaeus, Northern Pike  
Order Cypriniformes  
Family Cyprinidae  
*Cyprinus carpio* Linnaeus, Carp  
*Hybognathus hankinsoni* Hobbs, Brassy Minnow  
*Nocomis biguttatus* (Kirtland), Horneyhead Chub  
*Notemigonus crysoleucas* (Mitchill), Golden Shiner

*Notropis ardens* (Cope), Rosefin Shiner  
*N. cornutus* (Mitchill), Common Shiner  
*N. heterolepis* Eigenmann and Eigenmann, Blacknose Shiner  
*Phoxinus eos* (Cope), Northern Redbelly Dace  
*Pimephales notatus* (Rafinesque), Bluntnose Minnow  
*P. promelas* Rafinesque, Fathead Minnow  
*Rhinichthys atratulus* (Hermann), Blacknose Dace  
*Semotilus atromaculatus* (Mitchill), Creek Chub  
 Family Catostomidae  
*Carpionodes velifer* (Rafinesque), Highfin Carpsucker  
*Catostomus commersoni* (Lacépède), White Sucker  
*Hypentelium nigricans* (Lesueur), Northern Hog Sucker  
*Moxostoma macrolepidotum* (Lesueur), Shorthead Redhorse  
 Order Siluriformes  
 Family Ictaluridae  
*Ictalurus melas* (Rafinesque), Black Bullhead  
*I. natalis* (Lesueur), Yellow Bullhead  
*I. nebulosus* (Lesueur), Brown Bullhead  
*I. punctatus* (Rafinesque), Channel Catfish  
*Noturus gyrinus* (Mitchill), Tadpole Madtom  
*Pylodictis olivaris* (Rafinesque), Flathead Catfish  
 Order Atheriniformes  
 Family Cyprinodontidae  
*Fundulus zebrinus* Jordan and Gilbert, Rio Grande Killifish  
 Order Gasterosteiformes  
 Family Gasterosteidae  
*Culaea inconstans* (Kirtland), Brook Stickleback  
 Order Perciformes  
 Family Percichthyidae  
*Morone chrysops* (Rafinesque), White Bass  
 Family Centrarchidae  
*Ambloplites rupestris* (Rafinesque), Rock Bass  
*Lepomis cyanellus* Rafinesque, Green Sunfish  
*L. gibbosus* (Linnaeus), Pumpkinseed  
*L. gulosus* (Cuvier), Warmouth  
*L. humilis* (Girard), Orangespotted Sunfish  
*L. macrochirus* Rafinesque, Bluegill  
*L. megalotis* (Rafinesque), Longear Sunfish  
*Micropterus dolomieu* Lacépède, Smallmouth Bass  
*M. salmoides* (Lacépède), Largemouth Bass  
*Pomoxis annularis* Rafinesque, White Crappie  
*P. nigromaculatus* (Lesueur), Black Crappie  
 Family Percidae  
*Etheostoma exile* (Girard), Iowa Darter  
*E. nigrum* Rafinesque, Johnny Darter  
*Perca flavescens* (Mitchill), Yellow Perch  
*Stizostedion canadense* (Smith), Sauger  
*S. v. vitreum* (Mitchill), Walleye  
 Family Sciaenidae  
*Aplodinotus grunniens* Rafinesque, Freshwater Drum  
 Family Cottidae  
*Cottus bairdi* Girard, Mottled Sculpin

## Appendix B

### Sites and Sampling (Exhibits 2-89)

The field personnel indicated by their initials in the Exhibits may be identified according to the following legend.

|                            |                           |
|----------------------------|---------------------------|
| EA -- Edward Ambrogio      | MM -- Melanie Miller      |
| TDB -- Thomas D. Barnes    | KLM -- Kenneth L. Myers   |
| DJB -- Daniel J. Bereza    | WLN -- William L. Nichols |
| REB -- Richard E. Berry    | JAN -- John A. Nosek      |
| LC -- Loralee Clark        | JHP -- James H. Peck      |
| JME -- James M. Engel      | JLP -- James L. Peterson  |
| RAF -- Raymond A. Faber    | DHS -- Daniel H. Snyder   |
| DF -- Dona Finley          | SDS -- Steven D. Swanson  |
| MLBF -- Mary Luc B. Fuller | RLT -- Roger L. Thomas    |
| SLHF -- Samuel L.H. Fuller | SJT -- Sandra J. Thomas   |
| RCH -- Robert C. Halvorsen | KET -- Katherine E. Trapp |
| GJJ -- Gerald J. Janer     | TAW -- Todd A. Weber      |
| RJJ -- Roy J. Johannes     | RJW -- Robert J. Whiting  |
| KLJ -- Kenneth L. Johnson  | MAW -- Martha A. Whitson  |
| DJL -- David J. Langowski  | JPW -- John P. Wolflin    |
| LAL -- Larry A. Linse      |                           |

The area of the riverbed examined at a given Site is an approximation that was worked out in the following way. Field observations had indicated that the average length of a brail drag is about 500 feet. The length of an Academy brail is 10 feet. Therefore, the area of streambed that was covered by a single brail run is about 5,000 square feet. Multiplication of this product by the total number of brail runs gives the total area brailed at the Site.

Numbers of brail runs at certain Sites surveyed early in the field work are marked by an asterisk (\*). These figures are minima only, because the Principal Investigator had not recognized the usefulness of accurately recording totals of negative runs.

Exhibit 2

1. Cargill
2. Petersons Bar
3. Route I-35W Bridge

Mussel data, Exhibit 91 ; Map(s), Exhibit(s) 197,207

Pool(s): not applicable Date(s): 5 August 1977

Locality: Minnesota River, RM 10.5-12.9, Bloomington, Hennepin County, Minnesota.

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 15\* ; total, 15\*

Number of square feet brailed: 75,000

\* Minimum

Exhibit 3

4. Stillwater

Mussel data, Exhibit 93 ; Map(s), Exhibit(s) 199,208

Pool(s): not applicable Date(s): 7 August 1978

Locality: St. Croix River, RM 22.8-24.5, Stillwater, Washington County, Minnesota.

Collector(s): DJB, WLN, RLT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 12 ; negative, 49 ; total, 61

Number of square feet brailed: 305,000

Exhibit 4

5. Hudson

Mussel data, Exhibit 94 ; Map(s), Exhibit(s) 199,209  
Pool(s): not applicable Date(s): 8-13 August, 14-15 September  
1977; 14-19 July 1978  
Locality: St. Croix River, RM 15.9-18.1,  
Hudson, St. Croix County,  
Wisconsin.  
Collector(s): EA, DJB, RFB, JME, DF, SLHF, RCH, DJL, WLN, SDS, RLT, TAW, RJW, JPW  
Collecting technique(s): brailing, pollywogging, diving  
Brail runs: positive, 49 ; negative, 55 ; total, 104  
Number of square feet brailed: 520,000

Exhibit 5

6. Catfish Bar

Mussel data, Exhibit 95 ; Map(s), Exhibit(s) 199,210  
Pool(s): not applicable Date(s): 1,2 August 1978  
Locality: St. Croix River, RM 10.8-12.2, about 0.6 miles NE  
Afton, Washington County, Minnesota.  
Collector(s): DJB, MLBF, WLN, RLT  
Collecting technique(s): brailing  
Brail runs: positive, 14 ; negative, 67 ; total, 81  
Number of square feet brailed: 405,000

Exhibit 6

7. Kinnickinnic

Mussel data, Exhibit 96 ; Map(s), Exhibit(s) 199,211

Pool(s): not applicable Date(s): 19,20 July 1978

Locality: St. Croix River, RM 5.8-6.2, about 4.7 miles SSE  
Afton, Washington County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 17 ; total, 26

Number of square feet brailed: 130,000

Exhibit 7

8. SOO Line Railroad Bridge

Mussel data, Exhibit 100 ; Map(s), Exhibit(s) 196,212

Pool(s): Upper Saint Anthony Falls (USAF) Date(s): 2 August 1977

Locality: Mississippi River, RM 855.8-857.6, Minneapolis,  
Hennepin County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 10\* ; total, 10\*

Number of square feet brailed: 50,000

\* Minimum

Exhibit 8

9. Broadway and Plymouth Avenues Bridges

Mussel data, Exhibit 101 ; Map(s), Exhibit(s) 196,212

Pool(s): USAF \* Date(s): 2 August 1977

Locality: Mississippi River, RM 853.8-855.7, Minneapolis,  
Hennepin County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 6 ; total, 6

Number of square feet brailed: 30,000

\* Upper Saint Anthony Falls

Exhibit 9

10. Lake Street Bridge

Mussel data, Exhibit 104 ; Map(s), Exhibit(s) 196,213

Pool(s): 1 Date(s): 1 August 1977

Locality: Mississippi River, RM 849.1-850.6, St. Paul, Ramsey  
County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 10 ; total, 10

Number of square feet brailed: 50,000

Exhibit 10

11. St. Paul Daymark 849.1

Mussel data, Exhibit 105 ; Map(s), Exhibit(s) 196,215

Pool(s): 1

Date(s): 1 August 1977

Locality: Mississippi River, RM 847.8-849.1, St. Paul,  
Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 5 ; total, 5

Number of square feet brailed: 25,000

Exhibit 11

12. Locks and Dam 1 Upper Approach Construction

Mussel data, Exhibit 106 ; Map(s), Exhibit(s) 196,198,215

Pool(s): 1 and 2

Date(s): 2-3 August 1977

Locality: Mississippi River, RM 846.2-847.8, St. Paul,  
Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 14 ; total, 20

Number of square feet brailed: 100,000



Exhibit 12

13. Smith Avenue ("High") Bridge

Mussel data, Exhibit 108 ; Map(s), Exhibit(s) 198,214

Pool(s): 2

Date(s): 31 July 1977

Locality: Mississippi River, RM 839.2-840.6, St. Paul,  
Ramsey County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 6 ; total, 6

Number of square feet brailed: 50,000

Exhibit 13

14. Robinsons Rocks

Mussel data, Exhibit 109 ; Map(s), Exhibit(s) 198,215

Pool(s): 2

Date(s): 28 July 1977

Locality: Mississippi River, RM 825.0-826.6, about 3 miles  
S St. Paul Park, Washington County, Minnesota

Collector(s): EA, RFB, SLHF, RLT, RJW

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 12 ; total, 12

Number of square feet brailed: 60,000

Exhibit 14

15. Nininger

Mussel data, Exhibit 110 ; Map(s), Exhibit(s) 198,216

Pool(s): 2

Date(s): 29 July 1977

Locality: Mississippi River, RM 816.6-818.7, about 3 miles  
NE Hastings, Dakota County, Minnesota

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 14 ; total, 14

Number of square feet brailed: 70,000

Exhibit 15

16. Vermillion River

Mussel data, Exhibit 112 ; Map(s), Exhibit(s) 199,216

Pool(s): 3

Date(s): 1,10 August 1978

Locality: Mississippi River, RM 812.9-813.5, about 1.8 miles  
W Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 18 ; total, 18

Number of square feet brailed: 90,000

Exhibit 16

17. Hastings Small Boat Harbor

Mussel data, Exhibit 113 ; Map(s), Exhibit(s) 199,216

Pool(s): 3 Date(s): 28 July 1978

Locality: Mississippi River, RM 812.9-813.4, Hastings,  
Dakota County, Minnesota

Collector(s): DJB, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 11 ; total, 11

Number of square feet brailed: 55,000

Exhibit 17

18. Prescott

Mussel data, Exhibit 114 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 23 July 1978

Locality: Mississippi River, RM 809.2-811.8, Prescott,  
Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 11 ; negative, 56 ; total, 67

Number of square feet brailed: 335,000

Exhibit 18

19. Pine Coulee

Mussel data, Exhibit 115 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 1 August 1978

Locality: Mississippi River, RM 809.3-809.8, about 1.2 miles  
SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 13 ; total, 19

Number of square feet brailed: 95,000

Exhibit 19

20. Truedale Slough

Mussel data, Exhibit 116 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 24 July 1978

Locality: Mississippi River, RM 807.7-808.7, about 3.0 miles  
SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 29 ; total, 38

Number of square feet brailed: 190,000

Exhibit 20

21. Four Mile Island

Mussel data, Exhibit 117 ; Map(s), Exhibit(s) 199,217

Pool(s): 3 Date(s): 25 July 1978

Locality: Mississippi River, RM 806.7-807.7, about 4.0 miles  
SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 22 ; total, 27

Number of square feet brailed: 135,000

Exhibit 21

22. Big River

Mussel data, Exhibit 118 ; Map(s), Exhibit(s) 199,218

Pool(s): 3 Date(s): 26 July, 9 August 1978

Locality: Mississippi River, RM 803.9-806.1, about 6.2 miles  
SE Prescott, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 33 ; total, 42

Number of square feet brailed: 210,000

Exhibit 22

23. Morgan Coulee, 24. Coulters Island

Mussel data, Exhibit 119 ; Map(s), Exhibit(s) 199,219

Pool(s): 3 Date(s): 28,29 July 1978

Locality: Mississippi River, RM 800.8-803.0, about 1.8 miles  
NW Diamond Bluff, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 10 ; negative, 60 ; total, 70

Number of square feet brailed: 350,000

Exhibit 23

25. Diamond Bluff

Mussel data, Exhibit 120 ; Map(s), Exhibit(s) 199,219

Pool(s): 3 Date(s): 30 July 1978

Locality: Mississippi River, RM 798.9-800.5, Diamond Bluff,  
Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 17 ; negative, 26 ; total, 43

Number of square feet brailed: 215,000

Exhibit 24

26. Above Trenton

Mussel data, Exhibit 122 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 11,12 August 1978

Locality: Mississippi River, RM 794.9-796.4, about 1 mile  
WNW Trenton, Pierce County, Wisconsin

Collector(s): DJB, WLN, RLT

Collecting technique(s): brailing, pollywogging, scraping

Brail runs: positive, 7 ; negative, 31 ; tot ., 38

Number of square feet brailed: 190,000

Exhibit 25

27. Trenton

Mussel data, Exhibit 123 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 12 August 1978

Locality: Mississippi River, RM 793.7-794.9, Trenton, Pierce  
County, Wisconsin

Collector(s): DJB, WLN

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 13 ; negative, 20 ; total, 33

Number of square feet brailed: 165,000

Exhibit 26

28. Cannon River

Mussel data, Exhibit 124 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 16 August 1978

Locality: Mississippi River, RM 791.6-793.7, about 1.0 mile  
NW Red Wing, Goodhue County, Minnesota

Collector(s): SLHF, KLJ, WLN

Collecting technique(s): brailing

Brail runs: positive, 4 ; negative, 14 ; total, 18

Number of square feet brailed: 90,000

Exhibit 27

29. Red Wing Commercial and Small Boat Harbors

Mussel data, Exhibit 125 ; Map(s), Exhibit(s) 200,220

Pool(s): 4 Date(s): 20 August 1978

Locality: Mississippi River, RM 791.2-791.6, Red Wing, Goodhue  
County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 1 ; negative, 11 ; total, 12

Number of square feet brailed: 60,000



Exhibit 28

30. Red Wing Highway Bridge

Mussel data, Exhibit 126 ; Map(s), Exhibit(s) 200,221

Pool(s): 4 Date(s): 19 August 1978

Locality: Mississippi River, RM 789.2-791.2, Red Wing,  
Goodhue County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing, pollywogging, scraping

Brail runs: positive, 18 ; negative, 30 ; total, 48

Number of square feet brailed: 240,000

Exhibit 29

31. Bay City Small Boat Harbor

Mussel data, Exhibit 127 ; Map(s), Exhibit(s) 200,222

Pool(s): 4 Date(s): 20 August 1978

Locality: Mississippi River, RM 786.4, Bay City, Pierce County,  
Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 4 ; total, 4

Number of square feet brailed: 20,000

Exhibit 30

32. Bay City Commercial and Recreational Sites

Mussel data, Exhibit 128 ; Map(s), Exhibit(s) 200,222

Pool(s): 4 Date(s): 20 August 1978

Locality: Mississippi River, RM 786.2, Bay City, Pierce  
County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 3 ; total, 5.

Number of square feet brailed: 25,000

Exhibit 31

33. Wacouta Point

Mussel data, Exhibit 129 ; Map(s), Exhibit(s) 200,222

Pool(s): 4 Date(s): 21,22 August 1978

Locality: Mississippi River, RM 783.2-785.4, about 5.0 miles  
E Red Wing, Goodhue County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing, scraping

Brail runs: positive, 21 ; negative, 41 ; total, 62

Number of square feet brailed: 310,000

Exhibit 32

34. Lake City Small Boat Harbor

Mussel data, Exhibit 130 ; Map(s), Exhibit(s) 200,223

Pool(s): 4 Date(s): 18 September 1977,  
24 August 1978

Locality: Mississippi River, RM 772.4-  
772.8, Lake City, Wabasha  
County, Minnesota

Collector(s): EA, DJB, RAF, MLBF, SLHF, KLF, LAL, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 42 ; total, 51

Number of square feet brailed: 255,000

Exhibit 33

35. Reads Landing

Mussel data, Exhibit 131 ; Map(s), Exhibit(s) 201,224

Pool(s): 4 Date(s): 21-22, 29 September 1977

Locality: Mississippi River, RM 760.6-763.8, Reads Landing,  
Wabasha County, Minnesota

Collector(s): EA, DJB, SLHF, RCH, RLT

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 6 ; negative, 67 ; total, 73

Number of square feet brailed: 365,000

Exhibit 34

36. Wabasha Small Boat Harbor

Mussel data, Exhibit 132 ; Map(s), Exhibit(s) 201,224

Pool(s): 4 Date(s): 26 August 1978

Locality: Mississippi River, RM 760.5, Wabasha, Wabasha  
County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 7 ; total, 12

Number of square feet brailed: 60,000

Exhibit 35

37. Crats Island Bank Repair

Mussel data, Exhibit 133 ; Map(s), Exhibit(s) 201,224

Pool(s): 4 Date(s): 26 August 1978

Locality: Mississippi River, RM 759.2, about 1.0 miles E  
Wabasha, Wabasha County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 9 ; total, 9

Number of square feet brailed: 45,000

Exhibit 36

38. Teepeeota Point

Mussel data, Exhibit 134 ; Map(s), Exhibit(s) 201,225

Pool(s): 4 Date(s): 20 September 1977

Locality: Mississippi River, RM 757.0-758.4, about 2 miles  
SE Wabasha, Wabasha County, Minnesota

Collector(s): EA, DJB, RCH, RLT

Collecting technique(s): brailing

Brail runs: positive, 13 ; negative, 38 ; total, 51

Number of square feet brailed: 255,000

Exhibit 37

39. Grand Encampment

Mussel data, Exhibit 135 ; Map(s), Exhibit(s) 201,225

Pool(s): 4 Date(s): 19 September 1977

Locality: Mississippi River, RM 754.6-757.0, about 3.5 miles  
SE Wabasha, Wabasha County, Minnesota

Collector(s): EA, DJB, SLHF, RCH, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 31 ; total, 40

Number of square feet brailed: 200,000

Exhibit 38

40. Beef Slough

Mussel data, Exhibit 136 ; Map(s), Exhibit(s) 201,225

Pool(s): 4

Date(s): 27 August 1978

Locality: Mississippi River, RM 753.9-754.6, about 1.3 miles  
NW Alma, Buffalo County, Wisconsin

Collector(s): SLHF, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 6 ; negative, 11 ; total, 17

Number of square feet brailed: 85,000

Exhibit 39

41. Locks and Dam 4 Lower Approach

Mussel data, Exhibit 138 ; Map(s), Exhibit(s) 201,226

Pool(s): 5

Date(s): 27 August 1978

Locality: Mississippi River, RM 752.3-752.8, Alma, Buffalo  
County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 8 ; negative, 9 ; total, 17

Number of square feet brailed: 85,000

Exhibit 40

42. Mule Bend, 43. Head of Island 42 Bank Repair

Mussel data, Exhibit 139 ; Map(s), Exhibit(s) 201,226

Pool(s): 5

Date(s): 28 August 1978

Locality: Mississippi River, RM 748.3-749.6, about 2.0 miles  
S Alma, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 4 ; negative, 29 ; total, 33

Number of square feet brailed: 165,000

Exhibit 41

44. West Newton

Mussel data, Exhibit 140 ; Map(s), Exhibit(s) 201,227

Pool(s): 5

Date(s): 23-26 September 1977

Locality: Mississippi River, RM 746.6-748.3, about 3.5 miles  
SSE Alma, Buffalo County, Wisconsin

Collector(s): EA, DJB, RCH, RLT

Collecting technique(s): brailing

Brail runs: positive, 67 ; negative, 22 ; total, 89

Number of square feet brailed: 445,000

Exhibit 42

45. Weaver Bottoms Complex

Mussel data, Exhibit 141 ; Map(s), Exhibit(s) 201,228

Pool(s): 5 Date(s): 25-28 September 1977

Locality: Mississippi River, RM 741.0-746.6, Minneiska, Winona  
County, Minnesota

Collector(s): EA, DJB, RLT

Collecting technique(s): brailing

Brail runs: positive, 64 ; negative, 48 ; total, 112

Number of square feet brailed: 560,000

Exhibit 43

46. Locks and Dam 5 Culvert Construction

Mussel data, Exhibit 142 ; Map(s), Exhibit(s) 201,202,229

Pool(s): 5 and 5A Date(s): 26, 28 September 1977

Locality: Mississippi River, RM 740.4-740.6, about 3 miles SE  
Buffalo, Buffalo County, Wisconsin

Collector(s): DJB

Collecting technique(s): pollywogging, scraping



Exhibit 44

47. Locks and Dam 5 Lower Approach

Mussel data, Exhibit 144 ; Map(s), Exhibit(s) 202,229  
Pool(s): 5A Date(s): 28 August 1978  
Locality: Mississippi River, RM 737.6-738.0, about 4.6 miles NW  
Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 3 ; negative, 6 ; total, 9  
Number of square feet brailed: 45,000

Exhibit 45

48. Island 58, 49. Island 58 Bank Repair,  
50. Fountain City

Mussel data, Exhibit 145 ; Map(s), Exhibit(s) 202,230  
Pool(s): 5A Date(s): 30 August; 1, 2 September 1978  
Locality: Mississippi River, RM 733.0-735.4, about 1.2 miles NW  
Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, KLM, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 12 ; negative, 47 ; total, 59  
Number of square feet brailed: 295,000

Exhibit 46

51. Fountain City Service Base

Mussel data, Exhibit 146 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 2 September 1978

Locality: Mississippi River, RM 733.4, about 0.5 miles NW  
Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 0 ; negative, 8 ; total, 8

Number of square feet brailed: 40,000

Exhibit 47

52. Fountain City Small Boat Harbor

Mussel data, Exhibit 147 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 2 September 1978

Locality: Mississippi River, RM 732.9, Fountain City, Buffalo  
County, Wisconsin

Collector(s): KLJ, WLN, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 2 ; total, 4

Number of square feet brailed: 20,000

Exhibit 48

53. Betsy Slough, 54. Betsy Slough Bank Repair,  
55. Wilds Bend

Mussel data, Exhibit 148 ; Map(s), Exhibit(s) 202,230

Pool(s): 5A Date(s): 3 September 1978

Locality: Mississippi River, RM 729.8-732.0, about 2.0 miles SE  
Fountain City, Buffalo County, Wisconsin

Collector(s): KLJ, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 34 ; total, 39

Number of square feet brailed: 195,000

Exhibit 49

56. Locks and Dam 5A Upper Approach

Mussel data, Exhibit 149 ; Map(s), Exhibit(s) 202,231

Pool(s): 5A Date(s): 29, 31 August 1978

Locality: Mississippi River, RM 728.5-729.0, about 2.5 miles NW  
Winona, Winona County, Minnesota

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 3 ; negative, 9 ; total, 12

Number of square feet brailed: 60,000

Exhibit 50

57. Locks and Dam 5A Lower Approach

Mussel data, Exhibit 151 ; Map(s), Exhibit(s) 202,231  
Pool(s): 6 Date(s): 31 August, 1 September 1978  
Locality: Mississippi River, RM 728.0-728.5, about 2.6 miles NW  
Winona, Winona County, Minnesota  
  
Collector(s): KLJ, KLM, WLN, RLT, SJT  
Collecting technique(s): brailing  
  
Brail runs: positive, 1 ; negative, 13 ; total, 14  
Number of square feet brailed: 70,000

Exhibit 51

58. Winona Commercial Harbor and Small Boat Harbors

Mussel data, Exhibit 152 ; Map(s), Exhibit(s) 202,232  
Pool(s): 6 Date(s): 5 September 1978  
Locality: Mississippi River, RM 726.1-726.2, Winona, Winona County,  
Minnesota  
  
Collector(s): KLJ, MLBF, WLN, RLT, SJT  
Collecting technique(s): brailing  
  
Brail runs: positive, 1 ; negative, 21 ; total, 22  
Number of square feet brailed: 110,000

Exhibit 52

59. Winona Lower Railroad Bridge

Mussel data, Exhibit 153 ; Map(s), Exhibit(s) 202,232

Pool(s): 6 Date(s): 6 September 1978

Locality: Mississippi River, RM 723.2-724.2, Winona, Winona  
County, Minnesota

Collector(s): KLJ, WLN, RLT, SJT

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 10 ; negative, 19 ; total, 29

Number of square feet brailed: 145,000

Exhibit 53

60. Gravel Point

Mussel data, Exhibit 154 ; Map(s), Exhibit(s) 202,232

Pool(s): 6 Date(s): 7-9 September 1978

Locality: Mississippi River, RM 721.7-723.2, about 1.5 miles SE  
Winona, Winona County, Minnesota

Collector(s): TDB, LC, SLHF, GJJ, RJJ, KLJ, WLN, JAN, RLT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 15 ; negative, 15 ; total, 30

Number of square feet brailed: 150,000

Exhibit 54

61. Locks and Dam 6 Lower Approach

Mussel data, Exhibit 156 ; Map(s), Exhibit(s) 203,233

Pool(s): 7 Date(s): 13 September 1978

Locality: Mississippi River, RM 713.6-714.2, Trempealeau,  
Trempealeau County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 5 ; total, 14

Number of square feet brailed: 70,000

Exhibit 55

62. Richmond Island

Mussel data, Exhibit 157 ; Map(s), Exhibit(s) 203,233

Pool(s): 7 Date(s): 14 September 1978

Locality: Mississippi River, RM 711.2-713.0, about 2.0 miles SE  
Trempealeau, Trempealeau County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 16 ; negative, 36 ; total, 52

Number of square feet brailed: 260,000

Exhibit 56

63. Queens Bluff

Mussel data, Exhibit 158 ; Map(s), Exhibit(s) 203,233

Pool(s): 7 Date(s): 15 September 1978

Locality: Mississippi River, RM 710.0-710.7, about 4.0 miles  
SE Trempealeau, Trempealeau County, Wisconsin

Collector(s): KLJ, WLN, RLT

Collecting technique(s): brailing

Brail runs: positive, 14 ; negative, 5 ; total, 19

Number of square feet brailed: 95,000

Exhibit 57

64. Locks and Dam 7 Upper Approach

Mussel data, Exhibit 159 ; Map(s), Exhibit(s) 203,234

Pool(s): 7 Date(s): 17 September 1978

Locality: Mississippi River, RM 703.1-703.6, about 3.0 miles  
N La Crescent, Houston County, Minnesota

Collector(s): MLBF, KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 11 ; negative, 4 ; total, 15

Number of square feet brailed: 75,000

Exhibit 58

65. La Crosse Railroad Bridge

Mussel data, Exhibit 161 ; Map(s), Exhibit(s) 204,235

Pool(s): 8

Date(s): 18, 19 September 1978

Locality: Mississippi River, RM 699.0-700.4, about 1.0 mile  
E La Crescent, Houston County, Minnesota

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 13 ; negative, 25 ; total, 38

Number of square feet brailed: 190,000

Exhibit 59

66. Hingen Island Bank Repair

Mussel data, Exhibit 162 ; Map(s), Exhibit(s) 204,236

Pool(s): 8

Date(s): 22 September 1978

Locality: Mississippi River, RM 696.0-696.3, about 0.8 mile  
SW La Crosse, La Crosse County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 1 ; total, 6

Number of square feet brailed: 30,000



Exhibit 60

67. Sand Slough, 68. Sand Slough Bank Repair

Mussel data, Exhibit 163 ; Map(s), Exhibit(s) 204,256

Pool(s): 8 Date(s): 20, 21 September 1978

Locality: Mississippi River, RM 694.1-695.0, about 1.5 miles  
S La Crosse, La Crosse County, Wisconsin

Collector(s): KLJ, WLN, JHP, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 20 ; total, 29

Number of square feet brailed: 145,000

Exhibit 61

69. Root River

Mussel data, Exhibit 164 ; Map(s), Exhibit(s) 204,257

Pool(s): 8 Date(s): 22 September 1978

Locality: Mississippi River, RM 692.7-693.5, about 2.5 miles  
SW La Crosse, La Crosse County, Wisconsin

Collector(s): KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 19 ; total, 21

Number of square feet brailed: 105,000

Exhibit 62

70. Picayune Island

Mussel data, Exhibit 165 ; Map(s), Exhibit(s) 204,237

Pool(s): 8 Date(s): 12 June 1979

Locality: Mississippi River, RM 691.1-692.4, about 2.0 miles  
N Brownsville, Houston County, Minnesota

Collector(s): EA, MLBF, RLT

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 27 ; total, 32

Number of square feet brailed: 160,000

Exhibit 63

71. Above Brownsville

Mussel data, Exhibit 166 ; Map(s), Exhibit(s) 204,237

Pool(s): 8 Date(s): 2-3 October 1977

Locality: Mississippi River, RM 689.8-691.2, about 2 miles N  
Brownsville, Houston County, Minnesota

Collector(s): EA, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 34 ; negative, 24 ; total, 58

Number of square feet brailed: 290,000

Exhibit 64

72. Brownsville

Mussel data, Exhibit 167 ; Map(s), Exhibit(s) 204,238

Pool(s): 8

Date(s): 15 August 1977

Locality: Mississippi River, RM 685.4-689.8, Brownsville,  
Houston County, Minnesota

Collector(s): EA, SLHF, RLT, RJW

Collecting technique(s): brailing

Brail runs: positive, 20 ; negative, 9 ; total, 38

Number of square feet brailed: 190,000

Exhibit 65

73. Stoddard

Mussel data, Exhibit 167 ; Map(s), Exhibit(s) 204,238

Pool(s): 8

Date(s): 15 August 1977

Locality: Mississippi River, RM 684.8-685.2, about 1.2 mile  
S Stoddard, Vernon County, Wisconsin

Collector(s): EA, KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 11 ; negative, 13 ; total, 24

Number of square feet brailed: 120,000

Exhibit 66

74. Warners Landing

Mussel data, Exhibit 169 ; Map(s), Exhibit(s) 204,239  
Pool(s): 8 Date(s): 15, 17 June 1979  
Locality: Mississippi River, RM 682.8-683.9, about 2.0 miles S  
Stoddard, Vernon County, Wisconsin  
Collector(s): EA, SLHF, KLJ, RLT, TAW  
Collecting technique(s): brailing, pollywogging  
Brail runs: positive, 22 ; negative, 11 ; total, 33  
Number of square feet brailed: 165,000

Exhibit 67

75. Island 126, 76. Head of Island 126 Bank Repair

Mussel data, Exhibit 171 ; Map(s), Exhibit(s) 205,240  
Pool(s): 9 Date(s): 21 June 1979  
Locality: Mississippi River, RM 677.2-678.4, about 0.5 miles  
S Genoa, Vernon County, Wisconsin  
Collector(s): KLJ, RLT, TAW  
Collecting technique(s): brailing  
Brail runs: positive, 6 ; negative, 21 ; total, 27  
Number of square feet brailed: 135,000

Exhibit 68

77. Twin Island,  
78. Head of Twin Island Bank Repair

Mussel data, Exhibit 172 ; Map(s), Exhibit(s) 205,240

Pool(s): 9 Date(s): 21-22 June 1979

Locality: Mississippi River, RM 675.7-676.6, about 3.0 miles  
S Genoa, Vernon County, Wisconsin

Collector(s): EA, KLJ, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 4 ; negative, 26 ; total, 30

Number of square feet brailed: 150,000

Exhibit 69

79. Below Twin Island

Mussel data, Exhibit 173 ; Map(s), Exhibit(s) 205,240

Pool(s): 9 Date(s): 22 June 1979

Locality: Mississippi River, RM 675.7-676.6, about 4.0 miles  
S Genoa, Vernon County, Wisconsin

Collector(s): EA, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 2 ; negative, 18 ; total, 20

Number of square feet brailed: 100,000

Exhibit 70

80. Head of Battle Island

Mussel data, Exhibit 174 ; Map(s), Exhibit(s) 205, 241

Pool(s): 9 Date(s): 23 June 1979

Locality: Mississippi River, RM 670.7-672.0, about 1.0 mile  
S Victory, Vernon County, Wisconsin

Collector(s): EA, MLBF, TAW

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 28 ; total, 37

Number of square feet brailed: 185,000

Exhibit 71

81. DeSoto

Mussel data, Exhibit 175 ; Map(s), Exhibit(s) 205, 242

Pool(s): 9 Date(s): 24 June 1979

Locality: Mississippi River, RM 667.2-668.6, DeSoto, Vernon  
County, Wisconsin

Collector(s): EA, KLJ, RLT

Collecting technique(s): brailing

Brail runs: positive, 10 ; negative, 24 ; total, 34

Number of square feet brailed: 170,000

Exhibit 72

82. Above Indian Camp Light, 83. Mouth of Hummingbird  
Slough Bank Repair

Mussel data, Exhibit 176 ; Map(s), Exhibit(s) 205,243

Pool(s): 9 Date(s): 9-10 October 1977  
24 June 1979

Locality: Mississippi River, RM 666.0-667.0, DeSoto,  
Vernon County, Wisconsin

Collector(s): EA, SLHF, KLJ, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 13 ; negative, 23 ; total, 36

Number of square feet brailed: 180,000

Exhibit 73

84. Indian Camp Light

Mussel data, Exhibit 177 ; Map(s), Exhibit(s) 205, 243

Pool(s): 9 Date(s): 10-12 October 1977

Locality: Mississippi River, RM 664.9-666.0, about 2 miles  
SW DeSoto, Vernon County, Wisconsin

Collector(s): EA, SLHF, RLT

Collecting technique(s): brailing

Brail runs: positive, 9 ; negative, 21 ; total, 30

Number of square feet brailed: 150,000

Exhibit 74

85. Lansing Upper Light

Mussel data, Exhibit 178 ; Map(s), Exhibit(s) 205, 243

Pool(s): 9 Date(s): 11-12 October 1977

Locality: Mississippi River, RM 662.4-664.9, Lansing,  
Allamakee County, Iowa

Collector(s): EA, RLT

Collecting technique(s): brailing

Brail runs: positive, 18 ; negative, 36 ; total, 54

Number of square feet brailed: 270,000

Exhibit 75

86. Lansing Small Boat Harbor

Mussel data, Exhibit 179 ; Map(s), Exhibit(s) 205, 243

Pool(s): 9 Date(s): 25 June 1979

Locality: Mississippi River, RM 663.5, Lansing, Allamakee County,  
Iowa

Collector(s): EA, RLT

Collecting technique(s): brailing

Brail runs: positive, 1 ; negative, 2 ; total, 3

Number of square feet brailed: 15,000



Exhibit 76

87. Atchafalaya

Mussel data, Exhibit 180 ; Map(s), Exhibit(s) 205, 244

Pool(s): 9

Date(s): 26 June 1979

Locality: Mississippi River, RM 660.0-660.7, about 3.0 miles  
SE Lansing, Allamakee County, Iowa

Collector(s): EA, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 8 ; negative, 16 ; total, 24

Number of square feet brailed: 120,000

Exhibit 77

88. Crooked Slough Cut

Mussel data, Exhibit 181 ; Map(s), Exhibit(s) 205, 245

Pool(s): 9

Date(s): 27 June 1979

Locality: Mississippi River, RM 653.3-654.2, about 2.0 miles  
NW Lynxville, Crawford County, Wisconsin

Collector(s): KLJ, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 12 ; negative, 14 ; total, 26

Number of square feet brailed: 130,000

Exhibit 78

89. Locks and Dam 9 Upper Approach

Mussel data, Exhibit 182 ; Map(s), Exhibit(s) 205,246

Pool(s): 9 Date(s): 28 June 1979

Locality: Mississippi River, RM 648.0-648.4, about 2.5 miles  
SW Lynxville, Crawford County, Wisconsin

Collector(s): EA, RLT, TAW

Collecting technique(s): brailing

Brail runs: positive, 5 ; negative, 3 ; total, 8

Number of square feet brailed: 40,000

Exhibit 79

90. Locks and Dam 9 Lower Approach

Mussel data, Exhibit 184 ; Map(s), Exhibit(s) 206,246

Pool(s): 10 Date(s): 14 October 1978

Locality: Mississippi River, RM 647.5-647.9, about 2.2 miles  
NE Harpers Ferry, Allamakee County, Iowa

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 7 ; negative, 3 ; total, 10

Number of square feet brailed: 50,000

Exhibit 80

91. Hay Point Bank Repair

Mussel data, Exhibit 185 ; Map(s), Exhibit(s) 206,246

Pool(s): 10 Date(s): 5-6 October 1977

Locality: Mississippi River, RM 644.8-646.8, about 5 miles  
SW Lynxville, Crawford County, Wisconsin

Collector(s): EA, SLHF, JLP, RLT, SJT

Collecting technique(s): brailing

Brail runs: positive, 44 ; negative, 31 ; total, 75

Number of square feet brailed: 375,000

Exhibit 81

92. Jackson Island

Mussel data, Exhibit 186 ; Map(s), Exhibit(s) 206, 247

Pool(s): 10 Date(s): 13 October 1978

Locality: Mississippi River, RM 643.5-644.7, about 2.0 miles  
SSE Harpers Ferry, Allamakee County, Iowa

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 23 ; negative, 9 ; total, 32

Number of square feet brailed: 160,000

Exhibit 82

93. Mississippi Gardens

Mussel data, Exhibit 187 ; Map(s), Exhibit(s) 206, 247

Pool(s): 10 Date(s): 20 October 1978

Locality: Mississippi River, RM 642.4-643.4, about 5.0 miles  
N Prairie du Chien, Crawford County, Wisconsin

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Exhibit 83

94. Prairie du Chien East Channel

Mussel data, Exhibit 188 ; Map(s), Exhibit(s) 206, 248

Pool(s): 10 Date(s): 27, 28, 29, 30 September 1978

Locality: Mississippi River (East Channel), RM 633.3-635.8,  
Prairie du Chien, Crawford County, Wisconsin

Collector(s): KLJ, MLBF, MM, WLN, KET, RLT, MAW

Collecting technique(s): brailing

Brail runs: positive, 41 ; negative, 5 ; total, 46

Number of square feet brailcd: 230,000

Exhibit 84

95. Prairie du Chien Commercial and Small Boat Harbors

Mussel data, Exhibit 189 ; Map(s), Exhibit(s) 206, 248  
Pool(s): 10 Date(s): 8 October 1978  
Locality: Mississippi River, RM 635.2-635.5, Prairie du Chien,  
Crawford County, Wisconsin  
Collector(s): MLBF, KLJ, WLN  
Collecting technique(s): brailing

Exhibit 85

96. McGregor

Mussel data, Exhibit 190 ; Map(s), Exhibit(s) 206, 248  
Pool(s): 10 Date(s): 19 October 1978  
Locality: Mississippi River, RM 633.2-633.5, McGregor,  
Clayton County, Iowa  
Collector(s): MLBF, SLHF, KLJ, WLN, DHS, RLT, TAW  
Collecting technique(s): brailing  
  
Brail runs: positive, 5 ; negative, 12 ; total, 17  
Number of square feet brailed: 85,000

Exhibit 86

97. Wyalusing Bend Light

Mussel data, Exhibit 191 ; Map(s), Exhibit(s) 206, 249

Pool(s): 10 Date(s): 10 October 1978

Locality: Mississippi River, RM 628.6-629.4, about 1.5 miles  
N Wyalusing, Grant County, Wisconsin

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 10 ; negative, 12 ; total, 22

Number of square feet brailed: 110,000

Exhibit 87

98. Wyalusing

Mussel data, Exhibit 192 ; Map(s), Exhibit(s) 206, 249

Pool(s): 10 Date(s): 9 October 1978

Locality: Mississippi River, RM 626.9-628.0, Wyalusing,  
Grant County, Wisconsin

Collector(s): KLJ, WLN, TAW

Collecting technique(s): brailing

Brail runs: positive, 18 ; negative, 19 ; total, 37

Number of square feet brailed: 185,000

Exhibit 88

99. McMillan Island

Mussel data, Exhibit 193 ; Map(s), Exhibit(s) 206,250  
Pool(s): 10 Date(s): 30 June, 1 July 1979  
Locality: Mississippi River, RM 618.1-619.6, about 2.0 miles  
NE Guttenburg, Clayton County, Iowa

Collector(s): EA, MLBF, KLJ, RLT, SJT, TAW

Collecting technique(s): brailing, pollywogging

Brail runs: positive, 26 ; negative, 17 ; total, 43

Number of square feet brailed: 215,000

Exhibit 89

100. Locks and Dam 10 Upper Approach

Mussel data, Exhibit 194 ; Map(s), Exhibit(s) 206, 251  
Pool(s): 10 Date(s): 30 June 1979  
Locality: Mississippi River, RM 615.1-616.0, Guttenburg,  
Clayton County, Iowa

Collector(s): EA, KLJ, TAW

Collecting technique(s): brailing

Brail runs: positive, 3 ; negative, 5 : total, 8

Number of square feet brailed: 40,000

## Appendix C

### Past and Present Mussel Presence/Absence and Proportional Data

#### Exhibits 90-194

The legend below explains the symbolism used in the following Exhibits.

#### LEGEND

An "x" indicates presence; no symbol, absence. An "x" without a superscript indicates Academy 1977-1979 field collecting data. An "x" with a superscript indicates the presence of the given taxon within the given period of time; the superscript (see Superscripts, below) refers to the (non-Academy) source of the record.

The column to the left of the names of taxa consists of records of living mussels collected in 1977-1979. (The identity of the source is indicated by the presence or absence of superscripts, as described above.) Columns A, J, T, and % refer to living mussels collected by the Academy in 1977-1979.

#### Column Headings

- A - Adult specimen(s)
- J Juvenile specimen(s) (i.e., mussels bysally attached to the brail)
- T - Total of A and J
- % - The proportion expressed as percentage that the specimens of the given taxon are of all mussels collected at the given site.
- R - Recent presence records (i.e., for the period during or since the Finke (1966) survey in 1965)\*
- H - Historical occurrence records (i.e., for the period prior to 1965)\*\*

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\* An "x" without a superscript in the "R" column denotes 1977-1979 discovery by the Academy of recently dead mussel shells.

\*\* An "x" without a superscript in the "H" column denotes 1977-1979 discovery by the Academy of long-dead shells.



### Superscript

- A -- Grier and Mueller (1922-1923)
- B -- Baker (1903)
- D -- Dawley (1947)
- E -- Ellis' (1931a, 1931b) records, synopsized by van der Schalie and van der Schalie (1950)
- F -- Finke (1966)
- G -- Gale (1969)
- H -- M.E. Havlik (Malacological Consultants, La Crosse, Wisconsin, personal communication)
- I -- Coker (1919)
- J -- D.D. Williams (1978)
- L -- L. Halversen (Wabasha, Minnesota, personal communication)
- M -- Marking and Bills (1977)
- N -- National Biocentric (1977)
- P -- Perry (1979) [i.e., "Perry (1978)" in Fuller (1978b)]
- Q -- Shimek (1888)
- R -- National Biocentric (1979e)
- S -- Fuller (1977) [i.e., "Fuller (1977a)" in Fuller (1978b)]
- T -- T.M. Freitag (Rock Island District, USACE, personal communication)
- U -- Grier (1922)
- V -- Havlik and Stansbery (1978)
- W -- WDNR 1977-1980 UMR mussel survey
- Z -- S.D. Hinz (Iowa-Illinois Gas and Electric Company, Davenport, Iowa, personal communication)
- AA -- Morrison (1959)
- BB -- Baker (1905)
- CC -- Fuller (1979c)

The letter "x" is not used as a superscript, in order to avoid confusion with its use to indicate presence of a season. The other 25 letters of the English alphabet have been used, however, in Fuller (1978b) and/or the present report. Because the 25 have been exhausted, "double-lettering" (e.g., "AA") has been introduced. Certain letters (e.g., "C") that were used in Fuller (1978b), but whose corresponding references (Davis and Cawley, 1975, in this instance) are not needed in this report, have not been reassigned to another reference, in order to avoid confusion between the Academy's earlier report (i.e., Fuller, 1978b) and this one.

## EXHIBIT 90

## Study Area

Site data: Exhibit(s) 2-89

Map(s): Exhibit(s) 195

|  | A    | J   | T    | %    | R              | H              |
|--|------|-----|------|------|----------------|----------------|
| <i>Cumberlandia monodonta</i>                |      |     |      |      |                | X <sup>B</sup> |
| X <i>Quadrula metanevra</i>                  | 20   |     | 20   | 0.2  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Q. quadrula</i>                         | 149  |     | 149  | 1.4  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Q. nodulata</i>                         | 75   |     | 75   | 0.7  |                | X <sup>E</sup> |
| X <i>Q. pustulosa</i>                        | 615  |     | 615  | 6.0  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Tritogonia verrucosa</i>                | 15   |     | 15   | 0.1  | X <sup>F</sup> | X <sup>E</sup> |
| X <sup>W</sup> <i>Cyclonaias tuberculata</i> |      |     |      |      |                | X <sup>E</sup> |
| X <i>Fusconaias flava</i>                    | 761  | 2   | 763  | 7.4  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>F. ebena</i>                            | 1    |     | 1    | <0.1 | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Megalonaias gigantea</i>                | 66   |     | 66   | 0.6  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Anolema plicata</i> <sup>1</sup>        | 4353 | 11  | 4364 | 42.3 | X <sup>F</sup> | X <sup>E</sup> |
| X <sup>R</sup> <i>Plethobasus cyphus</i>     |      |     |      |      | X <sup>T</sup> | X <sup>E</sup> |
| X <i>Pleurobema cordatum</i> <sup>2</sup>    | 13   |     | 13   | 0.1  | X <sup>H</sup> | X <sup>E</sup> |
| X <i>Elliptio crassidens</i>                 | 4    |     | 4    | <0.1 |                | X <sup>E</sup> |
| X <i>E. dilatata</i>                         | 165  |     | 165  | 1.6  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Obliquaria reflexa</i>                  | 407  |     | 407  | 3.9  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Proptera alata</i>                      | 81   |     | 81   | 0.8  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>P. laevissima</i>                       | 76   | 26  | 102  | 1.0  | X <sup>F</sup> | X <sup>E</sup> |
| <i>P. capax</i> <sup>3</sup>                 |      |     |      |      |                | X <sup>E</sup> |
| <i>P. purpurata</i> <sup>4</sup>             |      |     |      |      |                |                |
| X <i>Leptodea fragilis</i>                   | 48   | 47  | 95   | 0.9  | X <sup>F</sup> | X <sup>E</sup> |
| <i>L. leptodon</i>                           |      |     |      |      |                | X <sup>V</sup> |
| X <i>Ellipsaria lineolata</i>                | 1    |     | 1    | <0.1 | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Truncilla truncata</i>                  | 71   | 2   | 73   | 0.7  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>T. donaciformis</i>                     | 1533 | 715 | 2248 | 21.8 | X <sup>Z</sup> | X <sup>E</sup> |
| X <i>Obovaria olivaria</i>                   | 150  |     | 150  | 1.5  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Actinonaias carinata</i>                | 4    |     | 4    | <0.1 | X <sup>Z</sup> | X <sup>E</sup> |
| <i>A. ellipsiformis</i>                      |      |     |      |      |                | X <sup>E</sup> |

|  | A   | J   | T   | %   | R              | H              |
|--|-----|-----|-----|-----|----------------|----------------|
| X <i>Ligumia recta</i>                       | 15  | 2   | 17  | 0.2 | X <sup>F</sup> | X <sup>E</sup> |
| <i>L. subrostrata</i>                        |     |     |     |     |                | X <sup>A</sup> |
| X <i>Carunculina parva</i>                   | 57  | 311 | 368 | 3.6 |                | X <sup>E</sup> |
| X <i>Lampsilis teres</i>                     | 7   |     | 7   | 0.1 | X <sup>F</sup> | X <sup>E</sup> |
| X <i>L. higginsii</i>                        | 10  |     | 10  | 0.1 | X <sup>F</sup> | X <sup>E</sup> |
| X <i>L. radiata siliquioidea</i>             | 58  |     | 58  | 0.6 | X <sup>F</sup> | X <sup>E</sup> |
| X <i>L. ovata ventricosa</i>                 | 271 | 5   | 276 | 2.7 | X <sup>F</sup> | X <sup>E</sup> |
| <i>Plagiola triquetra</i>                    |     |     |     |     |                | X <sup>A</sup> |
| X <i>Arcidens confragosus</i>                | 20  |     | 20  | 0.2 | X <sup>Z</sup> | X <sup>E</sup> |
| X <i>Lasmigona complanata</i>                | 17  |     | 17  | 0.2 | X <sup>Z</sup> | X <sup>E</sup> |
| <i>L. costata</i>                            |     |     |     |     | X <sup>H</sup> | X <sup>D</sup> |
| <i>L. compressa</i>                          |     |     |     |     |                |                |
| <i>Alasmidonta marginata</i>                 |     |     |     |     |                | X <sup>E</sup> |
| <i>A. viridis</i>                            |     |     |     |     |                | X <sup>A</sup> |
| <i>Simpsoniiconcha ambigua</i>               |     |     |     |     |                | X <sup>E</sup> |
| <i>Anodontorides ferussacianus</i>           |     |     |     |     |                |                |
| X <sup>H</sup> <i>Anodonta suborbiculata</i> |     |     |     |     |                |                |
| X <i>A. imbecillitis</i>                     | 14  | 5   | 17  | 0.2 | X <sup>H</sup> | X <sup>E</sup> |
| X <i>A. grandis</i>                          | 94  | 1   | 95  | 0.9 | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Strophitus undulatus</i>                | 11  |     | 11  | 0.1 | X <sup>F</sup> | X <sup>E</sup> |

Notes:

Records for "Heteropogon confusus" may represent *P. rubrum* and/or *P. confusus*. This may raise by 1 any of the taxa totals (Current, R, and/or H).

No record of this species' occurrence in the study area has been found. Because it has been observed in the UMR within the nearby Rock Island and/or St. Louis District(s) (Fuller, 1978b), it is listed here in order to provide space for possible future records.

# EXHIBIT 91

## Minnesota River

(1. Cargill, 2. Petersons Bar, 3. Route I-35W Bridge)

Site data: Exhibit(s) 2

Map(s): Exhibit(s) 197, 207

|                               | A | J | T | % | R | H              |
|-------------------------------|---|---|---|---|---|----------------|
| <i>Cumberlandia monodonta</i> |   |   |   |   |   |                |
| <i>Quadrula metanevra</i>     |   |   |   |   |   |                |
| <i>Q. quadrula</i>            |   |   |   |   |   | X <sup>D</sup> |
| <i>Q. nodulata</i>            |   |   |   |   |   |                |
| <i>Q. pustulosa</i>           |   |   |   |   |   | X <sup>D</sup> |
| <i>Tritogonia verrucosa</i>   |   |   |   |   |   | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i> |   |   |   |   |   |                |
| <i>Fusconaia flava</i>        |   |   |   |   |   | X <sup>D</sup> |
| <i>F. ebena</i>               |   |   |   |   |   |                |
| <i>Megalonaias gigantea</i>   |   |   |   |   |   | X <sup>D</sup> |
| <i>Amblema plicata</i>        |   |   |   |   |   | X <sup>D</sup> |
| <i>Plethobasus cyphus</i>     |   |   |   |   |   | X <sup>D</sup> |
| <i>Pleurobema cordatum</i>    |   |   |   |   |   | X <sup>D</sup> |
| <i>Elliptio crassidens</i>    |   |   |   |   |   | X <sup>D</sup> |
| <i>E. dilatata</i>            |   |   |   |   |   | X <sup>D</sup> |
| <i>Obliquaria reflexa</i>     |   |   |   |   |   | X <sup>D</sup> |
| <i>Proptera alata</i>         |   |   |   |   |   | X <sup>D</sup> |
| <i>P. laevissima</i>          |   |   |   |   |   | X <sup>D</sup> |
| <i>P. capax</i>               |   |   |   |   |   |                |
| <i>P. purpurata</i>           |   |   |   |   |   |                |
| <i>Leptodea fragilis</i>      |   |   |   |   |   | X <sup>D</sup> |
| <i>L. leptodon</i>            |   |   |   |   |   |                |
| <i>Ellipsaria lineolata</i>   |   |   |   |   |   | X <sup>D</sup> |
| <i>Truncilla truncata</i>     |   |   |   |   |   | X <sup>D</sup> |
| <i>T. donaciformis</i>        |   |   |   |   |   | X <sup>D</sup> |
| <i>Obovaria olivaria</i>      |   |   |   |   |   | X <sup>D</sup> |
| <i>Actinonaias carinata</i>   |   |   |   |   |   | X <sup>D</sup> |
| <i>A. ellipsiformis</i>       |   |   |   |   |   |                |

|                                   | A | J | T | % | R | H              |
|-----------------------------------|---|---|---|---|---|----------------|
| <i>Ligumia recta</i>              |   |   |   |   |   | X <sup>D</sup> |
| <i>L. subrostrata</i>             |   |   |   |   |   | X <sup>D</sup> |
| <i>Carunculina parva</i>          |   |   |   |   |   | X <sup>D</sup> |
| <i>Lampsilis teres</i>            |   |   |   |   |   | X <sup>D</sup> |
| <i>L. higginsii</i>               |   |   |   |   |   | X <sup>D</sup> |
| <i>L. radiata siliquoides</i>     |   |   |   |   |   | X <sup>D</sup> |
| <i>L. ovata ventricosa</i>        |   |   |   |   |   | X <sup>D</sup> |
| <i>Plagiola triquetra</i>         |   |   |   |   |   | X <sup>D</sup> |
| <i>Arcidens confragosus</i>       |   |   |   |   |   | X <sup>D</sup> |
| <i>Lasmigona complanata</i>       |   |   |   |   |   | X <sup>D</sup> |
| <i>L. costata</i>                 |   |   |   |   |   | X <sup>D</sup> |
| <i>L. compressa</i>               |   |   |   |   |   |                |
| <i>Alasmidonta marginata</i>      |   |   |   |   |   | X <sup>D</sup> |
| <i>A. viridis</i>                 |   |   |   |   |   |                |
| <i>Simpsoniconcha ambigua</i>     |   |   |   |   |   |                |
| <i>Anodontoides ferussacianus</i> |   |   |   |   |   | X <sup>D</sup> |
| <i>Anodonta suborbiculata</i>     |   |   |   |   |   |                |
| <i>A. imbecillis</i>              |   |   |   |   |   | X <sup>D</sup> |
| <i>A. grandis</i>                 |   |   |   |   |   | X <sup>D</sup> |
| <i>Strophitus undulatus</i>       |   |   |   |   |   |                |

0

0

0

0

0

32

Notes:

EXHIBIT 92  
St. Croix River

Site data: Exhibit(s) 3-6

Map(s): Exhibit(s) 199

|                                | A    | J | T    | %    | R | H              |
|--------------------------------|------|---|------|------|---|----------------|
| <i>Cumberlandia monodonta</i>  |      |   |      |      |   |                |
| X <i>Quadrula metanevra</i>    | 2    |   | 2    | 0.1  |   |                |
| X <i>Q. quadrula</i>           | 2    |   | 2    | 0.1  |   |                |
| <i>Q. nodulata</i>             |      |   |      |      |   |                |
| X <i>Q. pustulosa</i>          | 61   |   | 61   | 3.0  |   | X <sup>D</sup> |
| X <i>Tritogonia verrucosa</i>  | 15   |   | 15   | 0.7  |   | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i>  |      |   |      |      |   | X <sup>D</sup> |
| X <i>Fusconaias flava</i>      | 263  | 1 | 264  | 13.1 |   | X <sup>D</sup> |
| X <sup>J</sup> <i>F. ebena</i> |      |   |      |      |   |                |
| <i>Megalonaias gigantea</i>    |      |   |      |      |   | X <sup>D</sup> |
| X <i>Ambelma plicata</i>       | 1198 |   | 1198 | 59.3 |   | X <sup>D</sup> |
| <i>Plethobasus cyphus</i>      |      |   |      |      |   | X <sup>D</sup> |
| X <i>Pleurobema cordatum</i>   | 9    |   | 9    | 0.4  |   |                |
| X <i>Elliptio crassidens</i>   | 4    |   | 4    | 0.2  |   |                |
| X <i>E. dilatata</i>           | 90   |   | 90   | 4.5  |   | X <sup>D</sup> |
| X <i>Obliquaria reflexa</i>    | 40   |   | 40   | 2.0  |   | X <sup>D</sup> |
| X <i>Proptera alata</i>        | 28   |   | 28   | 1.4  |   | X <sup>D</sup> |
| X <i>P. laevissima</i>         |      | 3 | 3    | 0.1  |   | X <sup>D</sup> |
| <i>P. capax</i>                |      |   |      |      |   |                |
| <i>P. purpurata</i>            |      |   |      |      |   |                |
| X <i>Leptodea fragilis</i>     | 3    | 4 | 7    | 0.3  |   | X <sup>D</sup> |
| <i>L. leptodon</i>             |      |   |      |      |   |                |
| X <i>Ellipsaria lineolata</i>  | 1    |   | 1    | <0.1 |   |                |
| X <i>Truncilla truncata</i>    | 5    |   | 5    | 0.2  |   | X <sup>D</sup> |
| X <i>T. donaciformis</i>       | 18   | 6 | 24   | 1.2  |   |                |
| X <i>Obovaria olivaria</i>     | 2    |   | 2    | 0.1  |   | X <sup>D</sup> |
| X <i>Actinonaias carinata</i>  | 2    |   | 2    | 0.1  |   | X <sup>D</sup> |
| <i>A. ellipsiformis</i>        |      |   |      |      |   |                |

|                |                                   | A    | J  | T    | ‡     | R  | H              |
|----------------|-----------------------------------|------|----|------|-------|----|----------------|
|                | <i>Ligumia recta</i>              |      |    |      |       |    | X <sup>D</sup> |
|                | <i>L. subrostrata</i>             |      |    |      |       | ?X |                |
|                | <i>Carunculina parva</i>          |      |    |      |       |    | X <sup>D</sup> |
|                | <i>Lampsilis teres</i>            |      |    |      |       |    |                |
| X              | <i>L. higginsii</i>               | 10   |    | 10   | 0.5   |    | X <sup>D</sup> |
| X              | <i>L. radiata siliquidea</i>      | 41   |    | 41   | 2.0   |    | X <sup>D</sup> |
| X              | <i>L. ovata ventricosa</i>        | 178  | 1  | 179  | 8.9   |    | X <sup>D</sup> |
|                | <i>Plagiola triquetra</i>         |      |    |      |       |    |                |
|                | <i>Arcidens confragosus</i>       |      |    |      |       |    |                |
| X              | <i>Lasmigona complanata</i>       | 13   |    | 13   | 0.6   |    | X <sup>D</sup> |
| X <sup>J</sup> | <i>L. costata</i>                 |      |    |      |       | X  |                |
|                | <i>L. compressa</i>               |      |    |      |       |    |                |
| X <sup>J</sup> | <i>Alasmidonta marginata</i>      |      |    |      |       |    |                |
|                | <i>A. viridis</i>                 |      |    |      |       |    |                |
|                | <i>Simpsoniconcha ambigua</i>     |      |    |      |       |    |                |
|                | <i>Anodontoides ferussacianus</i> |      |    |      |       |    |                |
|                | <i>Anodonta suborbiculata</i>     |      |    |      |       |    |                |
| X              | <i>A. imbecillis</i>              | 1    |    | 1    | <0.1  | X  | X <sup>D</sup> |
| X              | <i>A. grandis</i>                 | 14   |    | 14   | 0.7   |    | X <sup>D</sup> |
| X              | <i>Strophitus undulatus</i>       | 5    |    | 5    | 0.2   |    | X <sup>D</sup> |
| <hr/>          |                                   |      |    |      |       |    |                |
| 28             |                                   | 2005 | 15 | 2020 | 100.0 | ?3 | 25             |

Notes:

## EXHIBIT 93

## 4. Stillwater

Site data: Exhibit(s) 3

Map(s): Exhibit(s) 199, 208

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 1  |   | 1  | 2.7  |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaias flava</i>     | 17 |   | 17 | 45.9 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 9  |   | 9  | 24.3 |   |   |
| <i>Plethobema cyphus</i>      |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1  |   | 1  | 2.7  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| X <i>P. laevissima</i>        |    | 3 | 3  | 8.1  |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    |    | 2 | 2  | 5.4  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciiformis</i>     | 1  |   | 1  | 2.7  |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |



A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*

|   |                             |   |   |     |
|---|-----------------------------|---|---|-----|
| X | <i>A. imbecillis</i>        | 1 | 1 | 2.7 |
| X | <i>A. grandis</i>           | 2 | 2 | 5.4 |
|   | <i>Strophitus undulatus</i> |   |   |     |

---

|   |    |   |    |       |   |   |
|---|----|---|----|-------|---|---|
| 9 | 32 | 5 | 37 | 100.0 | 0 | 0 |
|---|----|---|----|-------|---|---|

Notes:

## EXHIBIT 94

## 5. Hudson

Site data: Exhibit(s) 4

Map(s): Exhibit(s) 199, 209

|                                     | A    | J | T    | %    | R | H              |
|-------------------------------------|------|---|------|------|---|----------------|
| <i>Cumberlandia monodonta</i>       |      |   |      |      |   |                |
| X <i>Quadrula metanevra</i>         | 2    |   | 2    | 0.1  |   |                |
| X <i>Q. quadrula</i>                | 2    |   | 2    | 0.1  |   |                |
| <i>Q. nodulata</i>                  |      |   |      |      |   |                |
| X <i>Q. pustulosa</i>               | 59   |   | 59   | 3.1  |   | X <sup>D</sup> |
| X <i>Tritogonia verrucosa</i>       | 15   |   | 15   | 0.8  |   | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i>       |      |   |      |      |   | X <sup>D</sup> |
| X <i>Fusconaia flava</i>            | 215  | 1 | 216  | 11.3 |   | X <sup>D</sup> |
| X <sup>J</sup> <i>F. ebena</i>      |      |   |      |      |   |                |
| <i>Megalonaias gigantea</i>         |      |   |      |      |   | X <sup>D</sup> |
| X <i>Amblema plicata</i>            | 1172 |   | 1172 | 61.1 |   | X <sup>D</sup> |
| <i>Plethobasus cyphus</i>           |      |   |      |      |   |                |
| X <i>Pleurobema cordatum</i>        | 9    |   | 9    | 0.5  |   |                |
| X <i>Elliptio crassidens</i>        | 4    |   | 4    | 0.2  |   |                |
| X <i>E. dilatata</i>                | 83   |   | 83   | 4.3  |   |                |
| X <i>Obliquaria reflexa</i>         | 34   |   | 34   | 1.8  |   | X <sup>D</sup> |
| X <i>Proptera alata</i>             | 28   |   | 28   | 1.5  |   | X <sup>D</sup> |
| X <sup>J</sup> <i>P. laevissima</i> |      |   |      |      |   |                |
| <i>P. capax</i>                     |      |   |      |      |   |                |
| <i>P. purpurata</i>                 |      |   |      |      |   |                |
| X <i>Leptodea fragilis</i>          | 2    | 2 | 4    | 0.2  |   | X <sup>D</sup> |
| <i>L. leptodon</i>                  |      |   |      |      |   |                |
| X <i>Ellipsaria lineolata</i>       | 1    |   | 1    | 0.1  |   |                |
| X <i>Truncilla truncata</i>         | 5    |   | 5    | 0.3  |   | X <sup>D</sup> |
| X <i>T. donaciformis</i>            | 17   | 5 | 22   | 1.1  |   |                |
| X <i>Obovaria olivaria</i>          | 1    |   | 1    | 0.1  |   |                |
| X <i>Actinonaias carinata</i>       | 2    |   | 2    | 0.1  |   |                |
| <i>A. ellipsiformis</i>             |      |   |      |      |   |                |

|                                 | A    | J | T    | %     | R  | H              |
|---------------------------------|------|---|------|-------|----|----------------|
| <i>Ligaria recta</i>            |      |   |      |       |    | X <sup>D</sup> |
| <i>L. subrostrata</i>           |      |   |      |       | ?X |                |
| <i>Carunculina parva</i>        |      |   |      |       |    |                |
| <i>Lampsilis teres</i>          |      |   |      |       |    |                |
| X <i>L. higginsii</i>           | 10   |   | 10   | 0.5   |    | X <sup>D</sup> |
| X <i>L. radiata siliquoidea</i> | 40   |   | 40   | 2.1   |    | X <sup>D</sup> |
| X <i>L. ovata ventricosa</i>    | 178  | 1 | 179  | 9.3   |    |                |
| <i>Plagiola triquetra</i>       |      |   |      |       |    |                |
| <i>Arcidens confragosus</i>     |      |   |      |       |    |                |
| X <i>Lasmigona complanata</i>   | 13   |   | 13   | 0.7   |    | X <sup>D</sup> |
| <i>L. costata</i>               |      |   |      |       | X  |                |
| <i>L. compressa</i>             |      |   |      |       |    |                |
| <i>Alasmidonta marginata</i>    |      |   |      |       |    |                |
| <i>A. viridis</i>               |      |   |      |       |    |                |
| <i>Simpsoniconcha arctica</i>   |      |   |      |       |    |                |
| <i>Anodontoides fassina</i>     |      |   |      |       |    |                |
| <i>Anodonta suborbiculata</i>   |      |   |      |       |    |                |
| J <i>A. imbecillia</i>          |      |   |      |       | X  |                |
| <i>A. grandis</i>               | 12   |   | 12   | 0.6   |    | X <sup>L</sup> |
| <i>Strophodon insularis</i>     | 5    |   | 5    | 0.3   |    | X <sup>D</sup> |
|                                 | 1000 |   | 1018 | 100.0 | 73 | 16             |

Notes:

## EXHIBIT 95

## 6. Catfish Bar

Site data: Exhibit(s) 5

Map(s): Exhibit(s) 199, 210

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 1  |   | 1  | 2.7  |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaias flava</i>     | 22 |   | 22 | 59.5 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| X <i>Megalonaias gigantea</i> |    |   |    |      |   |   |
| <i>Amblema plicata</i>        | 3  |   | 3  | 8.1  |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| X <i>E. dilatata</i>          | 5  |   | 5  | 13.5 |   |   |
| X <i>Obliquaria reflexa</i>   | 3  |   | 3  | 8.1  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 1  |   | 1  | 2.7  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciformis</i>      |    | 1 | 1  | 2.7  |   |   |
| X <i>Obcvaria olivaria</i>    | 1  |   | 1  | 2.7  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J T S R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

8

50

1

57

10000

Notes:

## EXHIBIT 96

## 7. Kinnickinnic

Site data: Exhibit(s) 6

Map(s): Exhibit(s) 199, 211

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| <i>Q. pustulosa</i>           |    |   |    |      |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaria flava</i>     | 9  |   | 9  | 32.1 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 14 |   | 14 | 50.0 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| X <i>E. dilatata</i>          | 2  |   | 2  | 7.1  |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 7.1  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| <i>T. donaciformis</i>        |    |   |    |      |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                    | A  | J | T  | I     | R | H |
|------------------------------------|----|---|----|-------|---|---|
| <i>Ligula recta</i>                |    |   |    |       |   |   |
| <i>L. subrostrata</i>              |    |   |    |       |   |   |
| <i>Carex pilosa parva</i>          |    |   |    |       |   |   |
| <i>Lampyris teres</i>              |    |   |    |       |   |   |
| <i>L. higginsii</i>                |    |   |    |       |   |   |
| X <i>L. radiata siliquoides</i>    | 1  |   | 1  | 3.6   |   |   |
| <i>L. ovata ventricosa</i>         |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>          |    |   |    |       |   |   |
| <i>Arctidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmiogona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                  |    |   |    |       |   |   |
| <i>L. compressa</i>                |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>       |    |   |    |       |   |   |
| <i>A. viridis</i>                  |    |   |    |       |   |   |
| <i>Simpsoniconcha umbilica</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferrussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>      |    |   |    |       |   |   |
| <i>A. imbecilis</i>                |    |   |    |       |   |   |
| <i>A. grandis</i>                  |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>        |    |   |    |       |   |   |
| 5                                  | 28 |   | 28 | 100.0 | 0 | 0 |

Notes:

EXHIBIT 97  
Black River<sup>1</sup>

Site data: Exhibit(s)

Map(s): Exhibit(s) 203, 204

|   | A    | J | T    | %    | R | H |
|---|------|---|------|------|---|---|
| <i>Cumberlandia monodonta</i>           |      |   |      |      |   |   |
| <i>Quadrula metanevra</i>               |      |   |      |      |   |   |
| X <i>Q. quadrula</i>                    | 100  |   | 100  | 4.6  |   |   |
| <i>Q. nodulata</i>                      |      |   |      |      |   |   |
| X <i>Q. pustulosa</i>                   | 31   |   | 31   | 1.4  |   |   |
| X <i>Tritogonia verrucosa</i>           | 1    |   | 1    | <0.1 |   | X |
| <i>Cyclonacis tuberculata</i>           |      |   |      |      |   |   |
| X <i>Fusconacia flava</i>               | 59   |   | 59   | 2.7  |   |   |
| <i>F. ebena</i>                         |      |   |      |      |   | X |
| <i>Megalonacis gigantea</i>             |      |   |      |      |   |   |
| X <i>Amblema plicata</i>                | 1683 |   | 1683 | 76.9 |   |   |
| <i>Plethobasus cyphus</i>               |      |   |      |      |   |   |
| <i>Pleurobema cordatum</i> <sup>2</sup> |      |   |      |      |   | X |
| <i>Elliptio crassidens</i>              |      |   |      |      |   |   |
| <i>E. dilatata</i>                      |      |   |      |      |   |   |
| X <i>Obliquaria reflexa</i>             | 119  |   | 119  | 5.4  |   |   |
| X <i>Proptera alata</i>                 | 35   |   | 35   | 1.6  |   |   |
| X <i>P. laevissima</i>                  | 2    |   | 2    | 0.1  |   |   |
| <i>P. capax</i>                         |      |   |      |      |   |   |
| <i>P. purpurata</i>                     |      |   |      |      |   |   |
| <i>Lentodea fragilis</i>                | 16   |   | 16   | 0.7  |   |   |
| <i>L. lentodon</i>                      |      |   |      |      |   |   |
| <i>Valisaria lineolata</i>              |      |   |      |      |   | X |
| <i>Valisaria truncata</i>               | 24   |   | 24   | 1.1  |   |   |
| <i>Valisaria</i>                        | 60   |   | 60   | 2.7  |   |   |
| <i>Valisaria</i>                        |      |   |      |      | ? | ? |
| <i>Valisaria</i>                        |      |   |      |      |   | X |



|                                   | A  | J | T  | %    | R | H |
|-----------------------------------|----|---|----|------|---|---|
| X <i>Ligumia recta</i>            | 1  |   | 1  | <0.1 | X |   |
| <i>L. subrostrata</i>             |    |   |    |      |   |   |
| X <i>Canaculina parva</i>         | 1  |   | 1  | <0.1 |   |   |
| <i>Lampsilis teres</i>            |    |   |    |      |   |   |
| <i>L. higginsii</i>               |    |   |    |      |   | X |
| X <i>L. radiata siliquoidea</i>   | 1  |   | 1  | <0.1 |   |   |
| X <i>L. ovata ventricosa</i>      | 25 |   | 25 | 1.1  |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |      |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |      |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |      | X |   |
| <i>L. costata</i>                 |    |   |    |      |   |   |
| <i>L. compressa</i>               |    |   |    |      |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |      |   |   |
| <i>A. viridis</i>                 |    |   |    |      |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |      |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |      |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |      |   |   |
| X <i>A. imbecillis</i>            | 2  |   | 2  | 0.1  | X |   |
| X <i>A. grandis</i>               | 29 |   | 29 | 1.3  |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |      |   |   |

17<sup>1</sup>

2189<sup>1</sup>

0

2189<sup>1</sup> 100.0

24

27

#### Notes:

<sup>1</sup> All data are from Havlik (1978a). They do not figure in the cumulative total for the study area (Exhibit 90).

<sup>2</sup> See Exhibit 90, note 2. Havlik (1978a) found an equivocal *Pleurobema* that she called "Round Pigtoe". This is the vernacular name for *P. sintoria* that is used by D.H. Stansbery (OSU, personal communication), who verified Havlik's taxonomic identifications.

## EXHIBIT 98

## Upper Mississippi River

Site data: Exhibit(s) 7-89

Map(s): Exhibit(s) 195

|  | A    | J   | T    | %    | R              | H               |
|--|------|-----|------|------|----------------|-----------------|
| <i>Cumberlandia monodonta</i>                |      |     |      |      |                | X <sup>BB</sup> |
| X <i>Quadrula metanevra</i>                  | 18   |     | 18   | 0.2  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Q. quadrula</i>                         | 147  |     | 147  | 1.8  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Q. nodulata</i>                         | 75   |     | 75   | 0.9  | X <sup>Z</sup> | X <sup>E</sup>  |
| <i>Q. pustulosa</i>                          | 554  |     | 554  | 6.7  | X <sup>F</sup> | X <sup>E</sup>  |
| <i>Tritogonia verrucosa</i>                  |      |     |      |      | X <sup>F</sup> | X <sup>E</sup>  |
| X <sup>W</sup> <i>Cyclonaias tuberculata</i> |      |     |      |      |                | X <sup>E</sup>  |
| X <i>Fusconaia flava</i>                     | 498  | 1   | 499  | 6.0  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>F. ebena</i>                            | 1    |     | 1    | <0.1 | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Megalonaias gigantea</i>                | 66   |     | 66   | 0.8  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Amblema plicata</i>                     | 3155 | 11  | 3166 | 38.2 | X <sup>F</sup> | X <sup>E</sup>  |
| X <sup>R</sup> <i>Plethobasus cyphus</i>     |      |     |      |      | X <sup>T</sup> | X <sup>E</sup>  |
| X <i>Pleurobema cordatum</i> <sup>1</sup>    | 4    |     | 4    | <0.1 | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Elliptio crassidens</i>                 |      |     |      |      |                | X <sup>E</sup>  |
| X <i>E. dilatata</i>                         | 75   |     | 75   | 0.9  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Obliquaria reflexa</i>                  | 367  |     | 367  | 4.4  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Proptera alata</i>                      | 53   |     | 53   | 0.6  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>P. laevissima</i>                       | 76   | 23  | 99   | 1.2  | X <sup>F</sup> | X <sup>E</sup>  |
| <i>P. capax</i> <sup>2</sup>                 |      |     |      |      |                | X <sup>E</sup>  |
| <i>P. purpurata</i>                          |      |     |      |      |                |                 |
| X <i>Leptodea fragilis</i>                   | 45   | 43  | 88   | 1.1  | X <sup>F</sup> | X <sup>E</sup>  |
| <i>L. leptodon</i>                           |      |     |      |      |                | X <sup>V</sup>  |
| X <i>Ellipsaria lineolata</i>                |      |     |      |      | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Truncilla truncata</i>                  | 66   | 2   | 68   | 0.8  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>T. donaciformis</i>                     | 1515 | 709 | 2224 | 26.8 | X <sup>Z</sup> | X <sup>E</sup>  |
| X <i>Obovaria olivaria</i>                   | 148  |     | 148  | 1.8  | X <sup>F</sup> | X <sup>E</sup>  |
| X <i>Actinonaias carinata</i>                | 2    |     | 2    | <0.1 | X <sup>Z</sup> | X <sup>E</sup>  |
| <i>A. ellipsiformis</i>                      |      |     |      |      |                | X <sup>E</sup>  |

|   | A  | J   | T   | $\frac{3}{4}$ | R              | H              |
|---|----|-----|-----|---------------|----------------|----------------|
| X <i>Ligumia recta</i>                            | 15 | 2   | 17  | 0.2           | X <sup>F</sup> | X <sup>E</sup> |
| <i>L. subrostrata</i>                             |    |     |     |               |                | X <sup>I</sup> |
| X <i>Camnuculina parva</i>                        | 57 | 311 | 368 | 4.4           | X <sup>G</sup> | X <sup>E</sup> |
| X <i>Lampsilis teres</i>                          | 7  |     | 7   | 0.1           | X <sup>F</sup> | X <sup>E</sup> |
| X <sup>3</sup> <i>L. higginsii</i>                |    |     |     |               | X <sup>F</sup> | X <sup>E</sup> |
| X <i>L. radiata siliquoides</i>                   | 17 |     | 17  | 0.2           | X <sup>F</sup> | X <sup>E</sup> |
| X <i>L. ovata ventricosa</i>                      | 93 | 4   | 97  | 1.2           | X <sup>F</sup> | X <sup>E</sup> |
| <i>Plagiola triquetra</i>                         |    |     |     |               |                | X <sup>A</sup> |
| X <i>Anodonta confragosa</i>                      | 20 |     | 20  | 0.2           | X <sup>Z</sup> | X <sup>E</sup> |
| X <i>Lasmeigona complanata</i>                    | 4  |     | 4   | <0.1          | X <sup>Z</sup> | X <sup>E</sup> |
| X <sup>T</sup> <i>L. costata</i>                  |    |     |     |               | X <sup>H</sup> | X <sup>D</sup> |
| <i>L. compressa</i>                               |    |     |     |               | X <sup>P</sup> |                |
| <i>Alasmodonta marginata</i>                      |    |     |     |               |                | X <sup>E</sup> |
| <i>A. viridis</i>                                 |    |     |     |               |                | X <sup>A</sup> |
| <i>Simpsoniconcha arbigua</i>                     |    |     |     |               |                | X <sup>E</sup> |
| X <sup>N</sup> <i>Anodontoides ferrissacianus</i> |    |     |     |               |                |                |
| X <sup>T</sup> <i>Anodonta suborbiculata</i>      |    |     |     |               | X <sup>T</sup> | X <sup>I</sup> |
| X <i>A. imbecillia</i>                            | 13 | 3   | 16  | 0.2           | X <sup>H</sup> | X <sup>E</sup> |
| X <i>A. grandis</i>                               | 80 | 1   | 81  | 1.0           | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Strophitus undulatus</i>                     | 6  |     | 6   | 0.1           | X <sup>F</sup> | X <sup>E</sup> |

571

7177 1110 8237 100.0 35 48

#### Notes:

<sup>1</sup> See Exhibit 90, note 2.

<sup>2</sup> See Exhibit 90, note 3.

<sup>3</sup> A living *Lampsilis higginsii* was recovered by the Academy late in the 1978 season from the Prairie in Chica. East Channel bed during brailing to determine whether low water temperature was beginning to inhibit mussels' response to the brail. This brailing was not part of the formal sampling and its results are not otherwise reported.

EXHIBIT 99

Upper St. Anthony Falls Pool

Site data: Exhibit(s) 7,8

Map(s): Exhibit(s) 196

A J T % R H

---

*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaias flava*

*F. ebena*  
*Megalonaias gigantea*  
*Ambelma plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

---

Notes:

EXHIBIT 100

8. SOO Line Railroad Bridge

Site data: Exhibit(s) 7

Map(s): Exhibit(s) 196, 212

A J T % R H

---

*Cumberlandia monodonta*

*Quadrula metanevra*

*Q. quadrula*

*Q. nodulata*

*Q. pustulosa*

*Tritogonia verrucosa*

*Cyclonaias tuberculata*

*Fusconaias flava*

*F. ebena*

*Megalonaias gigantea*

*Amblema plicata*

*Plethobasus cyphus*

*Pleurobema cordatum*

*Elliptio crassidens*

*E. dilatata*

*Obliquaria reflexa*

*Proptera alata*

*P. laevissima*

*P. capax*

*P. purpurata*

*Leptodea fragilis*

*L. leptodon*

*Ellipsaria lineolata*

*Truncilla truncata*

*T. donaciformis*

*Obovaria olivaria*

*Actinonaias carinata*

*A. ellipsiformis*

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquioides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcaidens confusus*  
*Laerigella confusa*  
*L. costata*  
*L. compressa*

*Alasmodonta viridis*  
*A. viridis*  
*Simpsonia viridis*  
*Anodonta imbecilla*

*Anodonta imbecilla*  
*A. imbecilla*  
*A. grandis*  
*Strophitus undulatus*

---

Notes:

EXHIBIT 101

9. Broadway Avenue and Plymouth Avenue Bridges

Site data: Exhibit(s) 8

Map(s): Exhibit(s) 196, 212

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaias flava*

*F. ebena*  
*Megalonaias gigantea*  
*Amblema plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. domaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*



A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Anaidens confragosus*  
*Lasmyxona complanata*  
*L. costata*  
*L. compressa*

*A. emidonta marginata*  
*A. micellus*  
*Strophodonta ambigua*  
*A. latilabes ferussaciana*

*Anaidonta suborbiculata*  
*A. imberillii*  
*A. grandis*  
*Strophitus undulatus*

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Notes:

EXHIBIT 102<sup>1</sup>

Lower St. Anthony Falls Pool

Site data: Exhibit(s) None

Map(s): Exhibit(s) 196

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaias flava*

*F. ebena*  
*Megalonaias gigantea*  
*Ambleria plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciiformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

A J T S R H

*Sigamia* sp.  
*L. subrostrata*  
*Camponotus* sp.  
*Lampyris* sp.

*L. nigripennis*  
*L. nigriventris*  
*L. nigriventris*  
*L. nigriventris*

*L. nigriventris*  
*L. nigriventris*  
*L. nigriventris*

*L. nigriventris*  
*L. nigriventris*  
*L. nigriventris*

*L. nigriventris*  
*L. nigriventris*  
*L. nigriventris*  
*Stenophanes* sp.

---

Notes:

1. No sampling was conducted in this Pool.

EXHIBIT 103

Pool 1

Site data: Exhibit(s) 9-11

Map(s): Exhibit(s) 196

|                               | A | J | T | % | R | H |
|-------------------------------|---|---|---|---|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |   |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |   |   |   |
| <i>Q. quadrula</i>            |   |   |   |   |   |   |
| <i>Q. nodulata</i>            |   |   |   |   |   |   |
| <i>Q. pustulosa</i>           |   |   |   |   |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |   |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |   |   |   |
| <i>Fusconia flava</i>         |   |   |   |   |   |   |
| <i>F. ebena</i>               |   |   |   |   |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |   |   |   |
| <i>Amblema plicata</i>        |   |   |   |   |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |   |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |   |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |   |   |   |
| <i>E. dilatata</i>            |   |   |   |   |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |   |   |   |
| <i>Proptera alata</i>         |   |   |   |   |   |   |
| <i>P. laevissima</i>          |   |   |   |   |   |   |
| <i>P. capax</i>               |   |   |   |   |   |   |
| <i>P. purpurata</i>           |   |   |   |   |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |   |   | X |
| <i>L. leptodon</i>            |   |   |   |   |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |   |   |   |
| <i>Truncilla truncata</i>     |   |   |   |   |   | X |
| <i>T. ionaciiformis</i>       |   |   |   |   |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |   |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |   |   |   |
| <i>A. ellipsiiformis</i>      |   |   |   |   |   |   |

A J T S R H

*Ligumia recta*  
*L. subrestrata*  
*Saniculinia parva*  
*Lampsilis teres*

*L. ligens*  
*L. pallida siliquoides*  
*L. ovata ventricosa*  
*Platystrophia triquetra*

*L. ligens refragosa*  
*L. ligens complanata*  
*L. ligens*  
*L. ligens*

*L. ligens marginata*

*L. ligens alba undulata*  
*L. ligens alba geminata*

*L. ligens orbiculata*  
*L. ligens*  
*L. ligens*  
*Simulium undulatus*

Notes:

AD-A097 003

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA PA DIV OF--ETC F/G 6/6  
FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDAE) OF THE UPPER--ETC(U)  
SEP 80 S L FULLER

UNCLASSIFIED 79-24F-VOL-2

NL

2 OF 5

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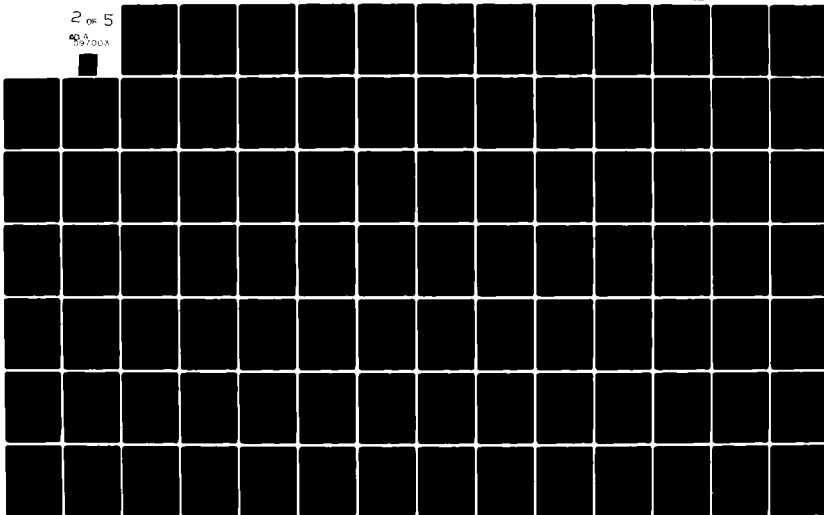


EXHIBIT 104

10. Lake Street Bridge

Site data: Exhibit(s) 9

Map(s): Exhibit(s) 196, 213

A J T % R H

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*Cumberlandia monodonta*

*Quadrula metanevra*

*Q. quadrula*

*Q. nodulata*

*Q. pustulosa*

*Tritogonia verrucosa*

*Cyclonaias tuberculata*

*Fusconaias flava*

*F. ebena*

*Megalonaias gigantea*

*Amblema plicata*

*Plethobasus cyphus*

*Pleurobema cordatum*

*Elliptio crassidens*

*E. dilatata*

*Obliquaria reflexa*

*Proptera alata*

*P. laevissima*

*P. capax*

*P. purpurata*

*Leptodea fragilis*

*L. leptodon*

*Ellipsaria lineolata*

*Truncilla truncata*

*T. donaciformis*

*Obovaria olivaria*

*Actinonaias carinata*

*A. ellipsiformis*

A T R

*Ligumia* n.  
*L. subrostrata*  
*Campanula*  
*Lampsilla*

*L. higginsi*  
*L. radiata*  
*L. ovata*  
*Plagiatus*

*Cardium*  
*Chamaelea*  
*Chamaelea*  
*Chamaelea*

*Chamaelea*  
*Chamaelea*  
*Chamaelea*  
*Chamaelea*

*Chamaelea*  
*Chamaelea*  
*Chamaelea*  
*Chamaelea*

0 0 0 0 0

Notes:



EXHIBIT 105

11. St. Paul Daymark 849.1

Site data: Exhibit(s) 10

Map( ): Exhibit(s) 196, 213

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaias flava*

*F. ebena*  
*Megalonaias gigantea*  
*Amblema plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

*...rota*  
*...rita*  
*...parva*  
*...teres*

*...siliquoida*  
*...intricosa*  
*...petra*

*...fragosa*  
*...lana*

*...argina*  
*...pila*  
*...feras*

*...proleuca*  
*...is*

*...undulatus*

Notes:

# EXHIBIT 106

## 12. Locks and Dam 1 Upper Approach Construction<sup>1</sup>

Site data: Exhibit(s) 11

Map(s): Exhibit(s) 196, 198, 213

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| <i>Q. pustulosa</i>           |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 1 |   | 1 | 5.0  |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 2 |   | 2 | 10.0 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| X <i>Leptodea fragilis</i>    | 1 |   | 1 | 5.0  |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| X <i>Truncilla truncata</i>   | 4 |   | 4 | 20.0 |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| X <i>Actinonaias carinata</i> | 2 |   | 2 | 10.0 |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

|                                  | A               | J | T               | %     | R | H |
|----------------------------------|-----------------|---|-----------------|-------|---|---|
| X <i>Ligumia recta</i>           | 1               |   | 1               | 5.0   |   |   |
| <i>L. subrostrata</i>            |                 |   |                 |       |   |   |
| <i>Carunculina puma</i>          |                 |   |                 |       |   |   |
| <i>Lampsilis teres</i>           |                 |   |                 |       |   |   |
| <i>L. higginsi</i>               |                 |   |                 |       |   |   |
| X <i>L. radiata obliquilinea</i> | 3               |   | 3               | 15.0  |   |   |
| X <i>L. ovata ventricosa</i>     | 4               |   | 4               | 20.0  |   |   |
| <i>Plagiola tenuis</i>           |                 |   |                 |       |   |   |
| <i>Anodonta imbecilis</i>        |                 |   |                 |       |   |   |
| <i>Lasmia</i>                    |                 |   |                 |       |   |   |
| <i>L. costalis</i>               |                 |   |                 |       |   |   |
| <i>L. complanata</i>             |                 |   |                 |       |   |   |
| <i>Alasmidonta</i>               |                 |   |                 |       |   |   |
| <i>A. viridis</i>                |                 |   |                 |       |   |   |
| <i>Simpsoniella</i>              |                 |   |                 |       |   |   |
| <i>Anodonta imbecilis</i>        |                 |   |                 |       |   |   |
| <i>Anodonta imbecilis</i>        |                 |   |                 |       |   |   |
| <i>A. imbecilis</i>              |                 |   |                 |       |   |   |
| <i>A. granulata</i>              |                 |   |                 |       |   |   |
| X <i>Strophitus undulatus</i>    | 2               |   | 2               | 10.0  |   |   |
| 9 <sup>1</sup>                   | 20 <sup>1</sup> | 0 | 20 <sup>1</sup> | 100.0 | 0 | 0 |

Notes:

- <sup>1</sup> All living mussels recovered from areas formally designated as "Locks and Dam 1 Upper Approach Construction" were actually brailed from the part of this Site *below* the locks and dam, i.e., the lower approach, in Pool 2. The data are therefore attributed to this Site but in Pool summaries they are attributed to Pool 2.

## EXHIBIT 107

Pool 2<sup>1</sup>

Site data: Exhibit(s) 11-14

Map(s): Exhibit(s) 198

|                               | A | J | T | %    | R | H              |
|-------------------------------|---|---|---|------|---|----------------|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |                |
| <i>Quadrula metanevra</i>     |   |   |   |      |   | X <sup>D</sup> |
| <i>Q. quadrula</i>            |   |   |   |      |   | X <sup>D</sup> |
| <i>Q. nodulata</i>            |   |   |   |      |   |                |
| <i>Q. pustulosa</i>           |   |   |   |      |   | X <sup>D</sup> |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |                |
| X <i>Fusconaia flava</i>      | 1 |   | 1 | 5.0  |   |                |
| <i>F. ebena</i>               |   |   |   |      |   |                |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |                |
| X <i>Amblema plicata</i>      | 2 |   | 2 | 10.0 |   | X              |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |                |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   | X              |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |                |
| <i>E. dilatata</i>            |   |   |   |      |   | X <sup>D</sup> |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |                |
| <i>Proptera alata</i>         |   |   |   |      |   | X <sup>D</sup> |
| <i>P. laevissima</i>          |   |   |   |      |   |                |
| <i>P. capax</i>               |   |   |   |      |   |                |
| <i>P. purpurata</i>           |   |   |   |      |   |                |
| X <i>Leptodea fragilis</i>    | 1 |   | 1 | 5.0  |   | X              |
| <i>L. leptodon</i>            |   |   |   |      |   |                |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   | X <sup>D</sup> |
| X <i>Truncilla truncata</i>   | 4 |   | 4 | 20.0 |   | X <sup>D</sup> |
| <i>T. donaciformis</i>        |   |   |   |      |   |                |
| <i>Obovaria olivaria</i>      |   |   |   |      |   | ?X             |
| X <i>Actinonaias carinata</i> | 2 |   | 2 | 10.0 |   | X <sup>D</sup> |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |                |

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See note 1, Exhibit 106.

EXHIBIT 108

Smith Avenue ("High") Bridge

Site data: Exhibit(s) 12

Map(s): Exhibit(s) 198, 214

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaia flava*

*F. ebena*  
*Megalonaias gigantea*  
*Amblema plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

11/10/68  
11/11/68  
11/12/68  
11/13/68

Notes:



EXHIBIT 109

Robinsons Rocks

Site data: Exhibit(s) 13

Map(s): Exhibit(s) 198, 215

|                               | A | J | T | % | R | H |
|-------------------------------|---|---|---|---|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |   |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |   |   |   |
| <i>Q. quadrula</i>            |   |   |   |   |   |   |
| <i>Q. nodulata</i>            |   |   |   |   |   |   |
| <i>Q. pustulosa</i>           |   |   |   |   |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |   |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |   |   |   |
| <i>Fusconaias flava</i>       |   |   |   |   |   |   |
| <i>F. ebena</i>               |   |   |   |   |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |   |   |   |
| <i>Amblema plicata</i>        |   |   |   |   |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |   |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |   |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |   |   |   |
| <i>E. dilatata</i>            |   |   |   |   |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |   |   |   |
| <i>Proptera alata</i>         |   |   |   |   |   |   |
| <i>P. laevissima</i>          |   |   |   |   |   |   |
| <i>P. capax</i>               |   |   |   |   |   |   |
| <i>P. purpurata</i>           |   |   |   |   |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |   |   |   |
| <i>L. lentodon</i>            |   |   |   |   |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |   |   |   |
| <i>Transilla truncata</i>     |   |   |   |   |   |   |
| <i>T. lonasiformis</i>        |   |   |   |   |   |   |
| <i>Obovaria obovata</i>       |   |   |   |   |   |   |
| <i>Actinonaias varinata</i>   |   |   |   |   |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |   |   |   |

Liquidation  
 of the Corporation  
 and the New York  
 State of the State

1. 1940  
2. 1941  
3. 1942  
4. 1943

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

[illegible][illegible]

## Notes

EXHIBIT 110

15. Nininger

Site data: Exhibit(s) 14

Map(s): Exhibit(s) 198, 216

A J T % R H

---

*Cumberlandia monodonta*

*Quadrula metanevra*

*Q. quadrula*

*Q. nodulata*

*Q. pustulosa*

*Tritogonia verrucosa*

*Cyclonaias tuberculata*

*Fusconaia flava*

*F. ebena*

*Megalonaias gigantea*

*Ambelma plicata*

*Plethobasus cyphus*

*Pleurobema cordatum*

*Elliptio crassidens*

*E. dilatata*

*Obliquaria reflexa*

*Proptera alata*

*P. laevissima*

*P. capax*

*P. purpurata*

*Leptodea fragilis*

*L. leptodon*

*Ellipsaria lineolata*

*Truncilla truncata*

*T. donaciformis*

*Obovaria olivaria*

*Actinonaias carinata*

*A. ellipsiformis*

A J T 3 R H

Ligaria  
L. sub  
Carina  
Lamp

L. h  
L. nall  
L. cur  
Staph

And  
Lacm  
L.  
L.

Alasm  
A. v  
Stem  
Anoth

Anod  
A. l  
A. g  
Stroph

0 0 0 0 0 0

Notes:

## EXHIBIT 111

## Pool 3

Site data: Exhibit(s) 15-23

Map(s): Exhibit(s) 199

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 25 |   | 25 | 17.6 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 55 |   | 55 | 38.7 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 28 |   | 28 | 19.7 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| X <i>E. dilatata</i>          | 5  |   | 5  | 3.5  |   |   |
| X <i>Obliquaria reflexa</i>   | 21 |   | 21 | 14.8 |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 1  |   | 1  | 0.7  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 2  |   | 2  | 1.4  |   |   |
| X <i>T. donaciiformis</i>     | 2  |   | 2  | 1.4  |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J F % R

*Ligaria recta*  
*L. subrostrata*  
*Gemmaulina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Aradens confragosus*  
*Lasmarona complanata*  
*L. costata*  
*L. sinuata*

*Ala viridula marginata*  
*A. lineata*  
*Ala niconcha ambigua*  
*Ala niconcha ferussakiana*

|                                   |   |   |     |
|-----------------------------------|---|---|-----|
| <i>Ala viridula suborbiculata</i> |   |   |     |
| X <i>A. niconcha</i>              | 1 | 1 | 0.7 |
| X <i>A. niconcha</i>              | 1 | 1 | 0.7 |
| X <i>A. niconcha undulatus</i>    | 1 | 1 | 0.7 |

|    |     |   |     |       |   |   |
|----|-----|---|-----|-------|---|---|
| 14 | 142 | 0 | 142 | 100.0 | 0 | 0 |
|----|-----|---|-----|-------|---|---|

Notes:

EXHIBIT 112

16. Vermillion River

Site data: Exhibit(s) 15

Map(s): Exhibit(s) 199, 216

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaia flava*

*F. ebena*  
*Megalonaias gigantea*  
*Ambelma plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

A J T % R H

*Ligumia nuda*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arceidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

0

0

0

0

0

0

Notes:



EXHIBIT 113

17. Hastings Small Boat Harbor

Site data: Exhibit(s) 16

Map(s): Exhibit(s) 199, 216

A J T % R H

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*Cumberlandia monodonta*

*Quadrula metanevra*

*Q. quadrula*

*Q. nodulata*

*Q. pustulosa*

*Tritogonia verrucosa*

*Cyclonaias tuberculata*

*Fusconaias flava*

*F. ebena*

*Megalonaias gigantea*

*Amblema plicata*

*Plethobasus cyphus*

*Pleurobema cordatum*

*Elliptio crassidens*

*E. dilatata*

*Obliquaria reflexa*

*Proptera alata*

*P. laevissima*

*P. capax*

*P. purpurata*

*Leptodea fragilis*

*L. leptodon*

*Ellipsaria lineolata*

*Truncilla truncata*

*T. donaciformis*

*Obovaria olivaria*

*Actinonaias carinata*

*A. ellipsiformis*

A J T C R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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0

0

0

0

0

0

Notes:

# EXHIBIT 114

18. Prescott

Site data: Exhibit(s) 17

Map(s): Exhibit(s) 119, 217

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 3 |   | 3 | 11.1 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 9 |   | 9 | 33.3 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 7 |   | 7 | 25.9 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| X <i>E. dilatata</i>          | 4 |   | 4 | 14.8 |   |   |
| X <i>Obliquaria reflexa</i>   | 3 |   | 3 | 11.1 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>T. donaciiformis</i>       |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

*Ligumia* ...  
*L. subrostrata*  
*Carinacula* ...  
*Lampsilis* ...

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha arbigua*  
*Anodontoides ferussacianus*

|   |                               |   |   |     |  |
|---|-------------------------------|---|---|-----|--|
|   | <i>Anodonta suborbiculata</i> |   |   |     |  |
|   | <i>A. imbecillis</i>          |   |   |     |  |
| X | <i>A. grandis</i>             | 1 | 1 | 3.7 |  |
|   | <i>Strophitus undulatus</i>   |   |   |     |  |

---

|   |    |   |    |       |   |   |
|---|----|---|----|-------|---|---|
| 6 | 27 | 0 | 27 | 100.0 | 0 | 0 |
|---|----|---|----|-------|---|---|

Notes:

# EXHIBIT 115

## 19. Pine Coulee

Site data: Exhibit(s) 18

Map(s): Exhibit(s) 199, 217

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 3 |   | 3 | 33.3 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaia flava</i>        |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| X <i>Megalonaias gigantea</i> | 3 |   | 3 | 33.3 |   |   |
| <i>Amblema plicata</i>        |   |   |   |      |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2 |   | 2 | 22.2 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>E. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias varinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J I C R

*L. radiata recta*  
*L. radiata*  
*Alpheoconcha parva*  
*Strophitis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontooides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*

|   |                             |   |   |      |  |  |
|---|-----------------------------|---|---|------|--|--|
| X | <i>Strophitus undulatus</i> | 1 | 1 | 11.1 |  |  |
|---|-----------------------------|---|---|------|--|--|

---

|   |  |   |   |   |       |   |   |
|---|--|---|---|---|-------|---|---|
| 4 |  | 9 | 0 | 9 | 100.0 | 0 | 0 |
|---|--|---|---|---|-------|---|---|

Notes:

## EXHIBIT 116

## 20. Truedale Slough

Site data: Exhibit(s) 19

Map(s): Exhibit(s) 199, 217

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 4  |   | 4  | 17.4 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 12 |   | 12 | 52.2 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Ambelma plicata</i>      | 2  |   | 2  | 8.7  |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 4  |   | 4  | 17.4 |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1  |   | 1  | 4.3  |   |   |
| <i>T. donaciformis</i>        |    |   |    |      |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Camnuculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

---

|   |    |   |    |       |   |   |
|---|----|---|----|-------|---|---|
| 5 | 23 | 0 | 23 | 100.0 | 0 | 0 |
|---|----|---|----|-------|---|---|

Notes:



## EXHIBIT 117

## 21. Four Mile Island

Site data: Exhibit(s) 20

Map(s): Exhibit(s) 199, 217

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 2  |   | 2  | 11.8 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 10 |   | 10 | 58.8 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 3  |   | 3  | 17.6 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 11.8 |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| <i>T. donaciformis</i>        |    |   |    |      |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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|   |    |   |    |       |   |   |
|---|----|---|----|-------|---|---|
| 4 | 17 | 0 | 17 | 100.0 | 0 | 0 |
|---|----|---|----|-------|---|---|

Notes:

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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4

17

0

17

100.0

0

0

Notes:

## EXHIBIT 118

## 22. Lig River

Site data: Exhibit(s) 21

Map(s): Exhibit(s) 199, 218

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 7  |   | 7  | 22.6 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 16 |   | 16 | 51.6 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 3  |   | 3  | 9.7  |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| X <i>E. dilatata</i>          | 1  |   | 1  | 3.2  |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 6.5  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1  |   | 1  | 3.2  |   |   |
| <i>T. donaciformis</i>        |    |   |    |      |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Cammulina parva</i>            |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsi</i>                |    |   |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| X <i>A. imbecillis</i>            | 1  |   | 1  | 3.2   |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| <hr/>                             |    |   |    |       |   |   |
| 7                                 | 31 | 0 | 31 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 119

23. Morgan Coulee, 24. Coulters Island

Site data: Exhibit(s) 22

Map(s): Exhibit(s) 199, 219

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 7.7  |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 1 |   | 1 | 7.7  |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 6 |   | 6 | 46.2 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 5 |   | 5 | 38.5 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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4

13 0 13 100.0 0 0

Notes:

## EXHIBIT 120

## 25. Diamond Bluff

Site data: Exhibit(s) 23

Map(s): Exhibit(s) 199, 219

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 5 |   | 5 | 22.7 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaias flava</i>     | 7 |   | 7 | 51.8 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 4 |   | 4 | 18.2 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 3 |   | 3 | 13.6 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| X <i>Leptodea fragilis</i>    | 1 |   | 1 | 4.5  |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciiformis</i>     | 2 |   | 2 | 9.1  |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |



A T 2 3 H

*Ligumia recta*  
*L. subrostrata*  
*Lamniculina purra*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoldea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmsgona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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22 0 22 100.0 0 0

Notes:

## EXHIBIT 121

Pool 4

Site data: Exhibit(s) 24-38

Map(s): Exhibit(s) 200,201

|   | A  | J  | T  | %    | R              | H              |
|---|----|----|----|------|----------------|----------------|
| <i>Cumberlandia monodonta</i>                             |    |    |    |      |                |                |
| X <i>Quadrula metanevra</i>                               | 2  |    | 2  | 0.6  |                | X <sup>E</sup> |
| X <i>Q. quadrula</i>                                      | 1  |    | 1  | 0.3  |                | X <sup>D</sup> |
| <i>Q. nodulata</i>  |    |    |    |      |                |                |
| X <i>Q. pustulosa</i>                                     | 21 |    | 21 | 6.4  | X <sup>F</sup> | X <sup>E</sup> |
| <i>Tritogonia verrucosa</i>                               |    |    |    |      |                | X <sup>E</sup> |
| X <sup>W</sup> <i>Cyclonaias tuberculata</i> <sup>1</sup> |    |    |    |      |                | X <sup>E</sup> |
| X <i>Fusconaias flava</i>                                 | 40 |    | 40 | 12.2 | X <sup>F</sup> | X <sup>E</sup> |
| <i>F. ebena</i>   |    |    |    |      |                | X <sup>E</sup> |
| <i>Megalonaias gigantea</i>                               |    |    |    |      |                | X <sup>E</sup> |
| X <i>Amblema plicata</i>                                  | 82 | 3  | 85 | 26.0 | X <sup>F</sup> | X <sup>E</sup> |
| X <sup>R</sup> <i>Plethobasus cyphus</i> <sup>1</sup>     |    |    |    |      |                | X <sup>E</sup> |
| X <i>Pleurobema cordatum</i> <sup>2</sup>                 | 1  |    | 1  | 0.3  |                | X <sup>E</sup> |
| <i>Elliptio crassidens</i>                                |    |    |    |      |                | X <sup>E</sup> |
| X <i>E. dilatata</i>                                      | 4  |    | 4  | 1.2  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Obliquaria reflexa</i>                               | 18 |    | 18 | 5.5  |                | X <sup>E</sup> |
| X <i>Proptera alata</i>                                   | 2  |    | 2  | 0.6  | X <sup>F</sup> | X <sup>E</sup> |
| X <i>P. laevissima</i>                                    | 35 | 19 | 54 | 16.5 |                | X <sup>E</sup> |
| <i>P. capax</i> <sup>3</sup>                              |    |    |    |      |                | X <sup>E</sup> |
| <i>P. purpurata</i>                                       |    |    |    |      |                |                |
| X <i>Leptodea fragilis</i>                                | 14 | 11 | 25 | 7.6  | X <sup>F</sup> | X <sup>E</sup> |
| <i>L. leptodon</i>  |    |    |    |      |                |                |
| <i>Ellipsaria lineolata</i>                               |    |    |    |      | X <sup>F</sup> | X <sup>E</sup> |
| X <i>Truncilla truncata</i>                               | 6  | 2  | 8  | 2.4  |                | X <sup>E</sup> |
| X <i>T. donaciiformis</i>                                 | 7  | 40 | 47 | 14.4 |                | X <sup>E</sup> |
| X <i>Obovaria olivaria</i>                                | 4  |    | 4  | 1.2  |                | X <sup>E</sup> |
| X <sup>R</sup> <i>Actinonaias carinata</i>                |    |    |    |      |                | X <sup>E</sup> |
| <i>A. ellipsiformis</i>                                   |    |    |    |      |                | X <sup>E</sup> |

|                                     | A | J | T | S   | R               | H               |
|-------------------------------------|---|---|---|-----|-----------------|-----------------|
| X <i>Ligumia recta</i> <sup>4</sup> |   |   |   |     | X <sup>F</sup>  | X <sup>F</sup>  |
| <i>L. subrostrata</i>               |   |   |   |     |                 | X <sup>F</sup>  |
| X <i>Carunculina parva</i>          | 1 | 5 | 4 | 1.2 | X <sup>F</sup>  | X <sup>E</sup>  |
| <i>Lampsilis teres</i>              |   |   |   |     |                 | X <sup>D</sup>  |
| <i>L. higginsi</i>                  |   |   |   |     |                 | X <sup>E</sup>  |
| X <i>L. radiata siliquioidea</i>    | 1 |   | 1 | 0.5 | X <sup>F</sup>  | X <sup>E</sup>  |
| X <i>L. ovata ventricosa</i>        | 4 | 1 | 5 | 1.5 | X <sup>F</sup>  | X <sup>E</sup>  |
| <i>Plagiola triquetra</i>           |   |   |   |     |                 | X <sup>D</sup>  |
| <i>Arcidens confragosus</i>         |   |   |   |     |                 | X <sup>E</sup>  |
| <i>Lasmigona complanata</i>         |   |   |   |     |                 | X <sup>D</sup>  |
| <i>L. costata</i>                   |   |   |   |     |                 | X <sup>D</sup>  |
| <i>L. compressa</i>                 |   |   |   |     |                 |                 |
| <i>Alasmidonta marginata</i>        |   |   |   |     |                 | X <sup>E</sup>  |
| <i>A. viridis</i>                   |   |   |   |     |                 |                 |
| <i>Simpsoniconcha ambigua</i>       |   |   |   |     |                 |                 |
| <i>Anodontoides ferussacianus</i>   |   |   |   |     |                 | X <sup>AA</sup> |
| <i>Anodonta suborbiculata</i>       |   |   |   |     |                 | X <sup>D</sup>  |
| X <i>A. imbecillis</i>              | 2 | 2 | 4 | 1.2 |                 | X <sup>E</sup>  |
| X <i>A. grandis</i>                 | 1 |   | 1 | 0.5 | 2X <sup>F</sup> | X <sup>E</sup>  |
| <i>Strophitus undulatus</i>         |   |   |   |     |                 | X <sup>E</sup>  |

25

246

81

527

190.0

122

58

#### Notes:

<sup>1</sup> See Exhibit 152, note 1.

<sup>2</sup> See Exhibit 154, note 2.

<sup>3</sup> This is the only record of this species in the St. Paul District in recent years.

<sup>4</sup> See Exhibit 156, note 4.

Note that in the St. Paul District, the only recorded species is *Anodonta imbecillis* (L.) (L. 1857). Note, also, that the central portion of the district is partially reworked for timber production.

## EXHIBIT 122

26. Above Trenton

Site data: Exhibit(s) 24

Map(s): Exhibit(s) 200, 220

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| <i>Q. pustulosa</i>           |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaias flava</i>     | 7 |   | 7 | 30.4 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 5 |   | 5 | 21.7 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| X <i>P. laevissima</i>        |   | 5 | 5 | 21.7 |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| X <i>Leptodea fragilis</i>    |   | 4 | 4 | 17.4 |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| X <i>Truncilla truncata</i>   | 1 |   | 1 | 4.3  |   |   |
| <i>T. donaciiformis</i>       |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Canthaculina pumila*  
*Lampsilis teres*

*L. higginsii*  
*L. pallata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Anodonta confusosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsondoncha ambigua*  
*Anodonta ferssacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

1 1 1.5

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14 9 25 100.0 0 0

Notes:

## EXHIBIT 123

27. Trenton

Site data: Exhibit(s) 25

Map(s): Exhibit(s) 200, 220

|       | A                             | J  | T  | %    | R | H |
|-------|-------------------------------|----|----|------|---|---|
| <hr/> |                               |    |    |      |   |   |
|       | <i>Cumberlandia monodonta</i> |    |    |      |   |   |
|       | <i>Quadrula metanevra</i>     |    |    |      |   |   |
| X     | <i>Q. quadrula</i>            | 1  | 1  | 1.0  |   |   |
|       | <i>Q. nodulata</i>            |    |    |      |   |   |
| X     | <i>Q. pustulosa</i>           | 9  | 9  | 8.9  |   |   |
|       | <i>Tritogonia verrucosa</i>   |    |    |      |   |   |
|       | <i>Cyclonaias tuberculata</i> |    |    |      |   |   |
| X     | <i>Fusconaias flava</i>       | 18 | 18 | 17.8 |   |   |
|       | <i>F. ebena</i>               |    |    |      |   |   |
|       | <i>Megalonaias gigantea</i>   |    |    |      |   |   |
| X     | <i>Amblema plicata</i>        | 24 | 24 | 23.8 |   |   |
|       | <i>Plethobasus cyphus</i>     |    |    |      |   |   |
|       | <i>Pleurobema cordatum</i>    |    |    |      |   |   |
|       | <i>Elliptio crassidens</i>    |    |    |      |   |   |
|       | <i>E. dilatata</i>            |    |    |      |   |   |
| X     | <i>Obliquaria reflexa</i>     | 7  | 7  | 6.9  |   |   |
| X     | <i>Proptera alata</i>         | 2  | 2  | 2.0  |   |   |
| X     | <i>P. laevissima</i>          | 25 | 25 | 24.8 |   |   |
|       | <i>P. canas</i>               |    |    |      |   |   |
|       | <i>P. purpurata</i>           |    |    |      |   |   |
| X     | <i>Leptodea fragilis</i>      | 3  | 3  | 3.0  |   |   |
|       | <i>L. leptodon</i>            |    |    |      |   |   |
|       | <i>Ellipsaria lineolata</i>   |    |    |      |   |   |
|       | <i>Truncilla truncata</i>     |    |    |      |   |   |
| X     | <i>T. donaciformis</i>        | 6  | 6  | 5.9  |   |   |
|       | <i>Obovaria olivaria</i>      |    |    |      |   |   |
|       | <i>Actinonaias carinata</i>   |    |    |      |   |   |
|       | <i>A. ellipsiformis</i>       |    |    |      |   |   |

|                                   | A   | J | T   | Q     | R | H |
|-----------------------------------|-----|---|-----|-------|---|---|
| <i>Ligaria recta</i>              |     |   |     |       |   |   |
| <i>L. subrostrata</i>             |     |   |     |       |   |   |
| <i>Carminulina parva</i>          |     |   |     |       |   |   |
| <i>Lampsilis teres</i>            |     |   |     |       |   |   |
| <i>L. higginsii</i>               |     |   |     |       |   |   |
| X <i>L. radiata siliquoides</i>   | 1   |   | 1   | 1.0   |   |   |
| X <i>L. ovata ventricosa</i>      | 1   |   | 4   | 1.0   |   |   |
| <i>Plagiola triquetra</i>         |     |   |     |       |   |   |
| <i>Anodonta confragosa</i>        |     |   |     |       |   |   |
| <i>Lasmigona complanata</i>       |     |   |     |       |   |   |
| <i>L. costata</i>                 |     |   |     |       |   |   |
| <i>L. compressa</i>               |     |   |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |   |     |       |   |   |
| <i>A. viridis</i>                 |     |   |     |       |   |   |
| <i>Simpsoniocrania ambigua</i>    |     |   |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |     |   |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |   |     |       |   |   |
| <i>A. imbecillis</i>              |     |   |     |       |   |   |
| X <i>A. grandis</i>               | 1   |   | 1   | 1.0   |   |   |
| <i>Strophitus undulatus</i>       |     |   |     |       |   |   |
| <hr/>                             |     |   |     |       |   |   |
| 12                                | 101 | 0 | 101 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 124

## 28. Cannon River

Site data: Exhibit(s) 26

Map(s): Exhibit(s) 200,220

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 8.3  |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaias flava</i>     | 2 |   | 2 | 16.7 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 8 |   | 8 | 66.7 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| X <i>Truncilla truncata</i>   | 1 |   | 1 | 8.3  |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |



*Ligula* *ovata*  
*L. subrotunda*  
*Stammulifera parva*  
*Lampsilis terec*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Anodonta confragosa*  
*Isomira confragosa*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniopsis umbilica*  
*Anodontoides jessurians*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

---

|   |   |   |    |       |   |   |
|---|---|---|----|-------|---|---|
| 1 | 1 | 0 | 12 | 100.0 | 0 | 0 |
|---|---|---|----|-------|---|---|

Notes:

# EXHIBIT 125

## 29. Red Wing Commercial and Small Boat Harbors

Site data: Exhibit(s) 27

Map(s): Exhibit(s) 200,220

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 50.0 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaia flava</i>        |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 1 |   | 1 | 50.0 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>T. donaciiformis</i>       |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J I S R T

*Ligula pectata*  
*L. subrostrata*  
*Camunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

2

2

0

2

100.0

0

0

Notes:

## EXHIBIT 126

## 30. Red Wing Highway Bridge

Site data: Exhibit(s) 28

Map(s): Exhibit(s) 200,221

|                               | A | J | T  | %    | R | H |
|-------------------------------|---|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |    |      |   |   |
| <i>Q. quadrula</i>            |   |   |    |      |   |   |
| <i>Q. nodulata</i>            |   |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 2 |   | 2  | 5.6  |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |    |      |   |   |
| <i>Fusconaia flava</i>        |   |   |    |      |   |   |
| <i>F. ebena</i>               |   |   |    |      |   |   |
| X <i>Megalonaias gigantea</i> |   |   |    |      |   |   |
| <i>Amblema plicata</i>        | 5 | 2 | 7  | 19.4 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |    |      |   |   |
| <i>E. dilatata</i>            |   |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 7 |   | 7  | 19.4 |   |   |
| <i>Proptera alata</i>         |   |   |    |      |   |   |
| X <i>P. laevissima</i>        | 1 | 3 | 4  | 11.1 |   |   |
| <i>P. capax</i>               |   |   |    |      |   |   |
| <i>P. purpurata</i>           |   |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 5 | 6 | 11 | 30.6 |   |   |
| <i>L. leptodon</i>            |   |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1 | 2 | 3  | 8.3  |   |   |
| <i>T. donaciiformis</i>       |   |   |    |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |    |      |   |   |

A J T K R H

*Ligumia recta*  
*L. subrostrata*  
*Camaculina parva*  
*Lampsilis teres*

*L. higginsi*  
*L. radiata siliquosae*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmodonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

|   |                               |   |   |     |  |
|---|-------------------------------|---|---|-----|--|
|   | <i>Anodonta suborbiculata</i> |   |   |     |  |
| X | <i>A. imbecillis</i>          | 2 | 2 | 5.6 |  |
|   | <i>A. grandis</i>             |   |   |     |  |
|   | <i>Strophitus undulatus</i>   |   |   |     |  |

---

|   |    |    |    |       |   |   |
|---|----|----|----|-------|---|---|
| 7 | 21 | 15 | 36 | 100.0 | 0 | 0 |
|---|----|----|----|-------|---|---|

Notes:

EXHIBIT 127

31. Bay City Small Boat Harbor

Site data: Exhibit(s) 29

Map(s): Exhibit(s) 200, 222

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaia flava*

*F. ebena*  
*Megalonaias gigantea*  
*Ambelma plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

A I I % R H

*Liguria recta*  
*L. subrostrata*  
*Carinaculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

0

0

0

0

0

0

Notes:

# EXHIBIT 128

## 32. Bay City Commercial and Recreational Site

Site data: Exhibit(s) 30

Map(s): Exhibit(s) 200, 222

|                               | A | J | T | %     | R | H |
|-------------------------------|---|---|---|-------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |       |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |       |   |   |
| <i>Q. quadrula</i>            |   |   |   |       |   |   |
| <i>Q. nodulata</i>            |   |   |   |       |   |   |
| <i>Q. pustulosa</i>           |   |   |   |       |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |       |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |       |   |   |
| <i>Fusconaia flava</i>        |   |   |   |       |   |   |
| <i>F. ebena</i>               |   |   |   |       |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |       |   |   |
| <i>Amblyma plicata</i>        |   |   |   |       |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |       |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |       |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |       |   |   |
| <i>E. dilatata</i>            |   |   |   |       |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |       |   |   |
| <i>Proptera alata</i>         |   |   |   |       |   |   |
| X <i>P. laevissima</i>        | 1 | 2 | 3 | 100.0 |   |   |
| <i>P. capax</i>               |   |   |   |       |   |   |
| <i>P. purpurata</i>           |   |   |   |       |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |       |   |   |
| <i>L. leptodon</i>            |   |   |   |       |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |       |   |   |
| <i>Truncilla truncata</i>     |   |   |   |       |   |   |
| <i>T. donaciformis</i>        |   |   |   |       |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |       |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |       |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |       |   |   |



*Ligaria* sp.  
*L. eurycephala*  
*Campanula* sp.  
*Campanula* sp.

*L. rigida*  
*L. parvifolia*  
*L. parvifolia*  
*Plagiola* sp.

*Anemone* sp.  
*Anemone* sp.  
*L. caerulea*  
*L. compressa*

*Alasridonta* sp.  
*A. viridis*  
*Simpsoniella* sp.  
*Anodonta* sp.

*Anodonta* sp.  
*A. imbecilis*  
*A. parva*  
*Donchitus* sp.

Notes:

## EXHIBIT 129

## 33. Wacouta Point

Site data: Exhibit(s) 31

Map(s): Exhibit(s) 200, 222

|                               | A | J | T  | %    | R | H |
|-------------------------------|---|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |    |      |   |   |
| <i>Q. quadrula</i>            |   |   |    |      |   |   |
| <i>Q. nodulata</i>            |   |   |    |      |   |   |
| <i>Q. pustulosa</i>           |   |   |    |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 2 |   | 2  | 4.9  |   |   |
| <i>F. ebena</i>               |   |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 8 | 1 | 9  | 22.0 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |    |      |   |   |
| <i>E. dilatata</i>            |   |   |    |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |    |      |   |   |
| <i>Proptera alata</i>         |   |   |    |      |   |   |
| X <i>P. laevissima</i>        | 8 | 8 | 16 | 39.0 |   |   |
| <i>P. capax</i>               |   |   |    |      |   |   |
| <i>P. purpurata</i>           |   |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 6 |   | 6  | 14.6 |   |   |
| <i>L. leptodon</i>            |   |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 3 |   | 3  | 7.3  |   |   |
| X <i>T. donaciformis</i>      |   | 3 | 3  | 7.3  |   |   |
| <i>Obovaria olivaria</i>      |   |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |    |      |   |   |

*L. ...*  
*L. ...*  
*L. ...*  
*L. ...*

*L. ...*  
*L. ... silique ...*  
*L. ...*  
*L. ...*

*L. ...*  
*L. ...*  
*L. ...*  
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*L. ...*  
*L. ...*  
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*L. ...*

*L. ...*  
*L. ...*  
*L. ...*  
*L. ...*

1908

EXHIBIT 130<sup>1</sup>

## 34. Lake City Small Boat Harbor

Site data: Exhibit(s) 32

Map(s): Exhibit(s) 200, 223

|                               | A | J | T | %    | R | H              |
|-------------------------------|---|---|---|------|---|----------------|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |                |
| <i>Quadrula metanevra</i>     |   |   |   |      |   | X <sup>D</sup> |
| <i>Q. quadrula</i>            |   |   |   |      |   | X <sup>D</sup> |
| <i>Q. nodulata</i>            |   |   |   |      |   |                |
| <i>Q. pustulosa</i>           |   |   |   |      |   |                |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |                |
| X <i>Fusconaia flava</i>      | 1 |   | 1 | 16.7 |   | X <sup>D</sup> |
| <i>F. ebena</i>               |   |   |   |      |   | X <sup>D</sup> |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   | X <sup>D</sup> |
| X <i>Amblema plicata</i>      | 3 |   | 3 | 50.0 |   | X <sup>D</sup> |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |                |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   | X <sup>D</sup> |
| <i>Elliptio crassidens</i>    |   |   |   |      |   | X <sup>D</sup> |
| X <i>E. dilatata</i>          | 1 |   | 1 | 16.7 |   | X <sup>D</sup> |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   | X <sup>D</sup> |
| <i>Proptera alata</i>         |   |   |   |      |   | X <sup>D</sup> |
| X <i>P. laevissima</i>        |   | 1 | 1 | 16.7 |   | X <sup>D</sup> |
| <i>P. capax</i>               |   |   |   |      |   |                |
| <i>P. purpurata</i>           |   |   |   |      |   |                |
| <i>Leptodea fragilis</i>      |   |   |   |      |   | X <sup>D</sup> |
| <i>L. leptodon</i>            |   |   |   |      |   |                |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   | X <sup>D</sup> |
| <i>Truncilla truncata</i>     |   |   |   |      |   | X <sup>D</sup> |
| <i>T. donaciformis</i>        |   |   |   |      |   |                |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |                |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |                |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |                |

|                                     | J | I | T | L | K | H              |
|-------------------------------------|---|---|---|---|---|----------------|
| X <i>Liguria recta</i> <sup>1</sup> |   |   |   |   |   | X <sup>D</sup> |
| <i>L. subrostrata</i>               |   |   |   |   |   |                |
| <i>Carinaculina parva</i>           |   |   |   |   |   | X <sup>D</sup> |
| <i>Lampsilis teres</i>              |   |   |   |   |   | X <sup>D</sup> |
| <i>L. higginsi</i>                  |   |   |   |   |   |                |
| <i>L. radiata siliquioidea</i>      |   |   |   |   |   | X <sup>D</sup> |
| <i>L. ovata ventricosa</i>          |   |   |   |   |   | X <sup>D</sup> |
| <i>Plagiola triquetra</i>           |   |   |   |   |   |                |
| <i>Arcidens confragosus</i>         |   |   |   |   |   |                |
| <i>Lasmigona complanata</i>         |   |   |   |   |   | X <sup>D</sup> |
| <i>L. costata</i>                   |   |   |   |   |   | X <sup>D</sup> |
| <i>L. compressa</i>                 |   |   |   |   |   |                |
| <i>Alasmidonta marginata</i>        |   |   |   |   |   |                |
| <i>A. viridis</i>                   |   |   |   |   |   |                |
| <i>Simpsoniconcha ambigua</i>       |   |   |   |   |   |                |
| <i>Anodontoides ferrussacianus</i>  |   |   |   |   |   |                |
| <i>Anodonta suborbiculata</i>       |   |   |   |   |   | X <sup>D</sup> |
| <i>A. imbecillis</i>                |   |   |   |   |   | X <sup>D</sup> |
| <i>A. grandis</i>                   |   |   |   |   |   | X <sup>D</sup> |
| <i>Strophitus undulatus</i>         |   |   |   |   |   |                |

---

|   |   |   |   |       |   |    |
|---|---|---|---|-------|---|----|
| 5 | 5 | 1 | 6 | 100.0 | 0 | 26 |
|---|---|---|---|-------|---|----|

Notes:

<sup>1</sup> Like some of Dawley's (1947) records, many of Morrison's (1959) records (Exhibit 121) come from near the Lake City Small Boat Harbor Site.

<sup>2</sup> The single 1977 living specimen of this species from this Site (Fuller, 1978b) was inadvertently omitted from this Exhibit.

## EXHIBIT 131

## 35. Reads Landing

Site data: Exhibit(s) 33

Map(s): Exhibit(s) 201, 224

|                               | A | J | T | %    | R              | H |
|-------------------------------|---|---|---|------|----------------|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |                |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |                |   |
| <i>Q. quadrula</i>            |   |   |   |      |                |   |
| <i>Q. nodulata</i>            |   |   |   |      |                |   |
| <i>Q. pustulosa</i>           |   |   |   |      | x              |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |                |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |                |   |
| x <i>Fusconaia flava</i>      | 1 |   | 1 | 6.3  | x <sup>L</sup> |   |
| <i>F. ebena</i>               |   |   |   |      |                |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |                |   |
| x <i>Ambleria plicata</i>     | 6 |   | 6 | 37.5 | x <sup>S</sup> |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |                |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      | x              |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |                |   |
| x <i>E. dilatata</i>          | 2 |   | 2 | 12.5 | x <sup>L</sup> |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      | x <sup>L</sup> |   |
| <i>Proptera alata</i>         |   |   |   |      | x <sup>L</sup> |   |
| <i>P. laevissima</i>          |   |   |   |      | x <sup>L</sup> |   |
| <i>P. capax</i>               |   |   |   |      |                |   |
| <i>P. purpurata</i>           |   |   |   |      |                |   |
| <i>Leptodea fragilis</i>      |   |   |   |      | x <sup>L</sup> |   |
| <i>L. leptodon</i>            |   |   |   |      |                |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |                |   |
| <i>Truncilla truncata</i>     |   |   |   |      | x <sup>L</sup> |   |
| x <i>I. donaciformis</i>      |   | 6 | 6 | 37.5 | x <sup>S</sup> |   |
| <i>Obovaria olivaria</i>      |   |   |   |      | x              |   |
| <i>Actinonaias carinata</i>   |   |   |   |      | x <sup>L</sup> |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |                |   |

|                                   | A | J | T  | %     | R              | H |
|-----------------------------------|---|---|----|-------|----------------|---|
| <i>Ligumia recta</i>              |   |   |    |       | x <sup>L</sup> |   |
| <i>L. subrostrata</i>             |   |   |    |       |                |   |
| <i>Carunculina parva</i>          |   |   |    |       |                |   |
| <i>Lampsilis teres</i>            |   |   |    |       |                |   |
| <i>L. higginsii</i>               |   |   |    |       |                |   |
| <i>L. radiata siliquoides</i>     |   |   |    |       | x <sup>L</sup> |   |
| x <i>L. ovata ventricosa</i>      |   | 1 | 1  | 6.3   | x <sup>S</sup> |   |
| <i>Plagiola triquetra</i>         |   |   |    |       |                |   |
| <i>Arcidens confragosus</i>       |   |   |    |       |                |   |
| <i>Lasmigona complanata</i>       |   |   |    |       |                |   |
| <i>L. costata</i>                 |   |   |    |       |                |   |
| <i>L. compressa</i>               |   |   |    |       |                |   |
| <i>Alasmidonta marginata</i>      |   |   |    |       |                |   |
| <i>A. viridis</i>                 |   |   |    |       |                |   |
| <i>Simpsoniconcha ambigua</i>     |   |   |    |       |                |   |
| <i>Anodontoides ferussacianus</i> |   |   |    |       |                |   |
| <i>Anodonta suborbiculata</i>     |   |   |    |       |                |   |
| <i>A. imbecillis</i>              |   |   |    |       | x <sup>L</sup> |   |
| <i>A. grandis</i>                 |   |   |    |       | x <sup>L</sup> |   |
| <i>Strophitus undulatus</i>       |   |   |    |       | x <sup>L</sup> |   |
| 5                                 | 9 | 7 | 16 | 100.0 | 19             | 0 |

Notes:

## EXHIBIT 132

## 36. Wabasha Small Boat Harbor

Site data: Exhibit(s) 34

Map(s): Exhibit(s) 201, 224

|   | A | J | T | %    | R | H |
|---|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i>                             |   |   |   |      |   |   |
| X <i>Quadrula metanevra</i>                               | 2 |   | 2 | 11.8 |   |   |
| <i>Q. quadrula</i>  |   |   |   |      |   |   |
| <i>Q. nodulata</i>  |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>                                     | 2 |   | 2 | 11.8 |   |   |
| <i>Tritogonia verrucosa</i>                               |   |   |   |      |   |   |
| X <sup>W</sup> <i>Cyclonaias tuberculata</i> <sup>1</sup> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>                                  | 3 |   | 3 | 17.6 |   |   |
| <i>F. ebena</i>   |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>                               |   |   |   |      |   |   |
| X <sup>R</sup> <i>Amblema plicata</i>                     | 6 |   | 6 | 35.3 |   |   |
| X <i>Plethobasus cyphus</i> <sup>1</sup>                  |   |   |   |      |   |   |
| X <sup>R</sup> <i>Pleurobema cordatum</i> <sup>2</sup>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>                                |   |   |   |      |   |   |
| X <sup>R</sup> <i>E. dilatata</i>                         | 1 |   | 1 | 5.9  |   |   |
| X <sup>R</sup> <i>Obliquaria reflexa</i>                  |   |   |   |      |   |   |
| X <sup>R</sup> <i>Proptera alata</i>                      |   |   |   |      |   |   |
| <i>P. laevissima</i>                                      |   |   |   |      |   |   |
| <i>P. capax</i>   |   |   |   |      |   |   |
| <i>P. purpurata</i>                                       |   |   |   |      |   |   |
| X <i>Leptodea fragilis</i>                                |   | 1 | 1 | 5.9  |   |   |
| <i>L. leptodon</i>  |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>                               |   |   |   |      |   |   |
| X <sup>R</sup> <i>Truncilla truncata</i>                  |   |   |   |      |   |   |
| X <sup>R</sup> <i>T. donaciformis</i>                     |   |   |   |      |   |   |
| X <sup>R</sup> <i>Obovaria olivaria</i>                   | 2 |   | 2 | 11.8 |   |   |
| X <sup>R</sup> <i>Actinonaias carinata</i>                |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>                                   |   |   |   |      |   |   |



A J T S R

- X *Ligumia ovata*
- X<sup>R</sup> *L. subrostrata*
- X<sup>R</sup> *Carunculina parva*
- Lampsilis teres*
- L. higginsii*
- X<sup>R</sup> *L. radiata siliquoidea*
- X<sup>R</sup> *L. ovata ventricosa*
- Plagiola triquetra*
- Arcidens confragosus*
- Lasmsgona complanata*
- L. costata*
- L. compressa*
- Alasmidonta marginata*
- A. viridis*
- Simpsoniconcha ambigua*
- Anodontoides ferussacianus*
- Anodonta suborbiculata*
- X<sup>R</sup> *A. imbecillis*
- X<sup>R</sup> *A. grandis*
- Strophitus undulatus*

20

16 1 17 100.0 0 0

# Notes:

- <sup>1</sup> This is the only record of this species alive in the St. Paul District in recent memory.

The "X<sup>R</sup>" records are from National Biocentric 1979a, in which the species were recorded at the site of the St. Paul District in 1979. The species were recorded in 1979, but the records were not published until 1979a.

EXHIBIT 133

37. Crats Island Bank Repair

Site data: Exhibit(s) 35

Map(s): Exhibit(s) 201, 224

A J T % R H

---

*Cumberlandia monodonta*

*Quadrula metanevra*

*Q. quadrula*

*Q. nodulata*

*Q. pustulosa*

*Tritogonia verrucosa*

*Cyclonaias tuberculata*

*Fusconaia flava*

*F. ebena*

*Megalonaias gigantea*

*Amblema plicata*

*Plethobasus cyphus*

*Pleurobema cordatum*

*Elliptio crassidens*

*E. dilatata*

*Obliquaria reflexa*

*Proptera alata*

*P. laevissima*

*P. capax*

*P. purpurata*

*Leptodea fragilis*

*L. leptodon*

*Ellipsaria lineolata*

*Truncilla truncata*

*T. donaciformis*

*Obovaria olivaria*

*Actinonaias carinata*

*A. ellipsiformis*

A J T % P H

*Ligumia recta*  
*L. subrostrata*  
*Carinaculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferrussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

0

0

0

0

0

0

Notes:

## EXHIBIT 134

## 38. Teepeeota Point

Site data: Exhibit(s) 36

Map(s): Exhibit(s) 201, 225

|                               | A | J  | T  | %    | R | H |
|-------------------------------|---|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |    |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |    |    |      |   |   |
| <i>Q. quadrula</i>            |   |    |    |      |   |   |
| <i>Q. nodulata</i>            |   |    |    |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |    | 1  | 3.8  |   |   |
| <i>Tritogonia verrucosa</i>   |   |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |    |    |      |   |   |
| X <i>Fusconaria flava</i>     | 1 |    | 1  | 3.8  |   |   |
| <i>F. ebena</i>               |   |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |    |    |      |   |   |
| X <i>Amblema plicata</i>      | 9 |    | 9  | 34.6 |   |   |
| <i>Plethobasus cyphus</i>     |   |    |    |      |   |   |
| X <i>Pleurobema cordatum</i>  | 1 |    | 1  | 3.8  |   |   |
| <i>Elliptio crassidens</i>    |   |    |    |      |   |   |
| <i>E. dilatata</i>            |   |    |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2 |    | 2  | 7.7  |   |   |
| <i>Proptera alata</i>         |   |    |    |      |   |   |
| <i>P. laevissima</i>          |   |    |    |      |   |   |
| <i>P. capax</i>               |   |    |    |      |   |   |
| <i>P. purpurata</i>           |   |    |    |      |   |   |
| <i>Leptodea fragilis</i>      |   |    |    |      |   |   |
| <i>L. leptodon</i>            |   |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |    |    |      |   |   |
| <i>Truncilla truncata</i>     |   |    |    |      |   | X |
| X <i>T. donaciformis</i>      |   | 10 | 10 | 38.5 |   |   |
| X <i>Obovaria olivaria</i>    | 1 |    | 1  | 3.8  |   |   |
| <i>Actinonaias carinata</i>   |   |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |    |    |      |   |   |

|                                   | A  | J  | T  | %     | R | H |
|-----------------------------------|----|----|----|-------|---|---|
| <i>Ligumia recta</i>              |    |    |    |       |   |   |
| <i>L. subrostrata</i>             |    |    |    |       |   |   |
| X <i>Camaculina parva</i>         |    | 1  | 1  | 3.8   |   |   |
| <i>Lampsilis teres</i>            |    |    |    |       |   |   |
| <i>L. higginsii</i>               |    |    |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |    |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |    |    |       | X |   |
| <i>Plagiola triquetra</i>         |    |    |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |    |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |    |    |       |   |   |
| <i>L. costata</i>                 |    |    |    |       |   |   |
| <i>L. compressa</i>               |    |    |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |    |    |       |   |   |
| <i>A. viridis</i>                 |    |    |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |    |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |    |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |    |    |       |   |   |
| <i>A. imbecillis</i>              |    |    |    |       |   |   |
| <i>A. grandis</i>                 |    |    |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |    |    |       |   |   |
| 8                                 | 15 | 11 | 26 | 100.0 | 2 | 0 |

Notes:

## EXHIBIT 135

## 39. Grand Encampment

Site data: Exhibit(s) 37

Map(s): Exhibit(s) 201, 225

|                               | A | J  | T  | %    | R | H |
|-------------------------------|---|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |    |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |    |    |      |   |   |
| <i>Q. quadrula</i>            |   |    |    |      |   |   |
| <i>Q. nodulata</i>            |   |    |    |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |    | 1  | 3.8  |   |   |
| <i>Tritogonia verrucosa</i>   |   |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |    |    |      |   |   |
| X <i>Fusconaia flava</i>      | 2 |    | 2  | 7.7  |   |   |
| <i>F. ebena</i>               |   |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |    |    |      |   |   |
| <i>Amblema plicata</i>        |   |    |    |      |   |   |
| <i>Plethobasus cyphus</i>     |   |    |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |    |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |    |    |      |   |   |
| <i>E. dilatata</i>            |   |    |    |      |   |   |
| <i>Obliquaria reflexa</i>     |   |    |    |      |   |   |
| <i>Proptera alata</i>         |   |    |    |      |   |   |
| <i>P. laevissima</i>          |   |    |    |      |   |   |
| <i>P. capax</i>               |   |    |    |      |   |   |
| <i>P. purpurata</i>           |   |    |    |      |   |   |
| <i>Leptodea fragilis</i>      |   |    |    |      |   |   |
| <i>L. leptodon</i>            |   |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |    |    |      |   |   |
| <i>Truncilla truncata</i>     |   |    |    |      |   |   |
| X <i>T. donaciformis</i>      |   | 21 | 21 | 80.8 |   |   |
| <i>Obovaria olivaria</i>      |   |    |    |      |   |   |
| <i>Actinonaias carinata</i>   |   |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |    |    |      |   |   |

|                                   | A | J  | T  | %     | R | H |
|-----------------------------------|---|----|----|-------|---|---|
| X                                 |   |    |    |       |   |   |
| <i>Ligumia recta</i>              |   |    |    |       |   |   |
| <i>L. subrostrata</i>             |   |    |    |       |   |   |
| <i>Carunculina parva</i>          |   | 2  | 2  | 7.7   |   |   |
| <i>Lampsilis teres</i>            |   |    |    |       |   |   |
| <i>L. higginsii</i>               |   |    |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |   |    |    |       |   |   |
| <i>L. ovata ventricosa</i>        |   |    |    |       |   |   |
| <i>Plagiola triquetra</i>         |   |    |    |       |   |   |
| <i>Arcidens confragosus</i>       |   |    |    |       |   |   |
| <i>Lasmigona complanata</i>       |   |    |    |       |   |   |
| <i>L. costata</i>                 |   |    |    |       |   |   |
| <i>L. compressa</i>               |   |    |    |       |   |   |
| <i>Alasmidonta marginata</i>      |   |    |    |       |   |   |
| <i>A. viridis</i>                 |   |    |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |    |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |   |    |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |   |    |    |       |   |   |
| <i>A. imbecillis</i>              |   |    |    |       | X |   |
| <i>A. grandis</i>                 |   |    |    |       |   |   |
| <i>Strophitus undulatus</i>       |   |    |    |       |   |   |
| 4                                 | 3 | 23 | 26 | 100.0 | 1 | 0 |

Notes:

## EXHIBIT 136

## 40. Beef Slough

Site data: Exhibit(s) 38

Map(s): Exhibit(s) 201, 225

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 4 |   | 4 | 22.2 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 3 |   | 3 | 16.7 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 7 |   | 7 | 38.9 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2 |   | 2 | 11.1 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 5.6  |   |   |
| X <i>Obovaria olivaria</i>    | 1 |   | 1 | 5.6  |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |



A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carmaculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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|   |    |   |    |       |   |   |
|---|----|---|----|-------|---|---|
| 6 | 18 | 0 | 18 | 100.0 | 0 | 0 |
|---|----|---|----|-------|---|---|

Notes:

## EXHIBIT 137

Pool 5

Site data: Exhibit(s) 39-43

Map(s): Exhibit(s) 201

|                               | A  | J   | T   | %    | R              | H              |
|-------------------------------|----|-----|-----|------|----------------|----------------|
| <i>Cumberlandia monodonta</i> |    |     |     |      |                |                |
| <i>Quadrula metanevra</i>     |    |     |     |      |                |                |
| <i>Q. quadrula</i>            |    |     |     |      |                |                |
| <i>Q. nodulata</i>            |    |     |     |      |                |                |
| X <i>Q. pustulosa</i>         | 9  |     | 9   | 1.3  | X              | X <sup>D</sup> |
| <i>Tritogonia verrucosa</i>   |    |     |     |      |                | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i> |    |     |     |      |                |                |
| X <i>Fusconaia flava</i>      | 3  |     | 3   | 0.4  | X              | X <sup>D</sup> |
| <i>F. ebena</i>               |    |     |     |      |                | X <sup>D</sup> |
| <i>Megalonaias gigantea</i>   |    |     |     |      |                |                |
| X <i>Ambelma plicata</i>      | 21 | 2   | 23  | 3.2  | X              |                |
| <i>Plethobasus cyphus</i>     |    |     |     |      |                | X <sup>D</sup> |
| <i>Pleurobema cordatum</i>    |    |     |     |      |                |                |
| <i>Elliptio crassidens</i>    |    |     |     |      |                |                |
| <i>E. dilatata</i>            |    |     |     |      |                | X <sup>D</sup> |
| X <i>Obliquaria reflexa</i>   | 3  |     | 3   | 0.4  | X              | X <sup>D</sup> |
| <i>Proptera alata</i>         |    |     |     |      | X              |                |
| X <i>P. laevissima</i>        | 2  | 3   | 5   | 0.7  | X <sup>F</sup> |                |
| <i>P. capax</i>               |    |     |     |      |                |                |
| <i>P. purpurata</i>           |    |     |     |      |                |                |
| X <i>Leptodea fragilis</i>    | 1  | 9   | 10  | 1.4  | X              |                |
| <i>L. leptodon</i>            |    |     |     |      |                |                |
| <i>Ellipsaria lineolata</i>   |    |     |     |      | X <sup>F</sup> | X <sup>D</sup> |
| X <i>Truncilla truncata</i>   | 2  |     | 2   | 0.3  |                |                |
| X <i>T. donaciformis</i>      | 4  | 572 | 576 | 81.0 | X <sup>A</sup> |                |
| X <i>Obovaria olivaria</i>    | 1  |     | 1   | 0.1  | X <sup>A</sup> |                |
| <i>Actinonaias carinata</i>   |    |     |     |      |                | X <sup>D</sup> |
| <i>A. ellipsiformis</i>       |    |     |     |      |                |                |

|                                   | A  | J   | T   | %     | R              | H              |
|-----------------------------------|----|-----|-----|-------|----------------|----------------|
| X <i>Ligumia recta</i>            |    | 1   | 1   | 0.1   | X <sup>F</sup> | X <sup>D</sup> |
| <i>L. subrostrata</i>             |    |     |     |       |                |                |
| X <i>Carunculina parva</i>        | 5  | 68  | 73  | 10.3  |                |                |
| <i>Lampsilis teres</i>            |    |     |     |       |                |                |
| <i>L. higginsii</i>               |    |     |     |       |                |                |
| X <i>L. radiata siliquoidea</i>   | 1  |     | 1   | 0.1   | X              | X <sup>D</sup> |
| X <i>L. ovata ventricosa</i>      | 1  |     | 1   | 0.1   |                | X <sup>D</sup> |
| <i>Plagiola triquetra</i>         |    |     |     |       |                |                |
| X <i>Arcidens confragosus</i>     | 1  |     | 1   | 0.1   |                | X <sup>D</sup> |
| <i>Lasmigona complanata</i>       |    |     |     |       |                | X <sup>D</sup> |
| <i>L. costata</i>                 |    |     |     |       |                | X <sup>D</sup> |
| <i>L. compressa</i>               |    |     |     |       |                |                |
| <i>Alasmidonta marginata</i>      |    |     |     |       |                |                |
| <i>A. viridis</i>                 |    |     |     |       |                |                |
| <i>Simpsoniconcha ambigua</i>     |    |     |     |       |                |                |
| <i>Anodontoides ferussacianus</i> |    |     |     |       |                |                |
| <i>Anodonta suborbiculata</i>     |    |     |     |       |                |                |
| X <i>A. imbecillis</i>            | 1  |     | 1   | 0.1   |                |                |
| X <i>A. grandis</i>               |    | 1   | 1   | 0.1   | X              |                |
| <i>Strophitus undulatus</i>       |    |     |     |       | X <sup>F</sup> |                |
| 16                                | 55 | 656 | 711 | 100.0 | 14             | 15             |

Notes:

## EXHIBIT 138

## 41. Locks and Dam 4 Lower Approach

Site data: Exhibit(s) 39

Map(s): Exhibit(s) 201, 226

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 6.3  |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaia flava</i>        |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 1 |   | 1 | 6.3  |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1 |   | 1 | 6.3  |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| X <i>P. laevissima</i>        |   | 2 | 2 | 12.5 |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| X <i>Leptodea fragilis</i>    |   | 4 | 4 | 25.0 |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      |   | 6 | 6 | 37.5 |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmitigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha arbigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*

X *A. grandis* 1 1 6.3  
*Strophitus undulatus*

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7 3 13 16 100.0 0 0

Notes:

## EXHIBIT 139

42. Mule Bend, 43. Head of Island 42 Bank Repair

Site data: Exhibit(s) 40

Map(s): Exhibit(s) 201, 226

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 16.7 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaia flava</i>        |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| <i>Ambelma plicata</i>        |   |   |   |      |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| X <i>Leptodea fragilis</i>    |   | 3 | 3 | 50.0 |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| X <i>Truncilla truncata</i>   | 2 |   | 2 | 33.3 |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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|   |   |   |   |       |   |   |
|---|---|---|---|-------|---|---|
| 3 | 3 | 3 | 6 | 100.0 | 0 | 0 |
|---|---|---|---|-------|---|---|

Notes:

EXHIBIT 140  
44. West Newton

Site data: Exhibit(s) 41

Map(s): Exhibit(s) 201, 227

|                               | A | J   | T   | %    | R | H |
|-------------------------------|---|-----|-----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |     |     |      |   |   |
| <i>Quadrula metanevra</i>     |   |     |     |      |   |   |
| <i>Q. quadrula</i>            |   |     |     |      |   |   |
| <i>Q. nodulata</i>            |   |     |     |      |   |   |
| X <i>Q. pustulosa</i>         | 2 |     | 2   | 0.5  | X |   |
| <i>Tritogonia verrucosa</i>   |   |     |     |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |     |     |      |   |   |
| <i>Fusconaia flava</i>        |   |     |     |      | X |   |
| <i>F. ebena</i>               |   |     |     |      |   |   |
| <i>Megalonaias gigantea</i>   |   |     |     |      |   |   |
| X <i>Amblema plicata</i>      | 1 | 1   | 2   | 0.5  | X |   |
| <i>Plethobasus cyphus</i>     |   |     |     |      |   |   |
| <i>Pleurobema cordatum</i>    |   |     |     |      |   |   |
| <i>Elliptio crassidens</i>    |   |     |     |      |   |   |
| <i>E. dilatata</i>            |   |     |     |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1 |     | 1   | 0.2  | X |   |
| <i>Proptera alata</i>         |   |     |     |      | X |   |
| X <i>P. laevissima</i>        | 1 | 1   | 2   | 0.5  |   |   |
| <i>P. capax</i>               |   |     |     |      |   |   |
| <i>P. purpurata</i>           |   |     |     |      |   |   |
| <i>Leptodea fragilis</i>      |   |     |     |      | X |   |
| <i>L. leptodon</i>            |   |     |     |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |     |     |      |   |   |
| <i>Truncilla truncata</i>     |   |     |     |      |   |   |
| X <i>T. donaciformis</i>      | 3 | 352 | 355 | 83.1 | X |   |
| X <i>Obovaria olivaria</i>    | 1 |     | 1   | 0.2  | X |   |
| <i>Actinonaias carinata</i>   |   |     |     |      |   |   |
| <i>A. ellipsiformis</i>       |   |     |     |      |   |   |



|                                   | A | J  | T  | %    | R | H |
|-----------------------------------|---|----|----|------|---|---|
| X <i>Ligumia recta</i>            |   | 1  | 1  | 0.2  |   |   |
| <i>L. subrostrata</i>             |   |    |    |      |   |   |
| X <i>Carunculina parva</i>        |   | 63 | 63 | 14.8 |   |   |
| <i>Lampsilis teres</i>            |   |    |    |      |   |   |
| <i>L. higginsii</i>               |   |    |    |      |   |   |
| <i>L. radiata siliquoidea</i>     |   |    |    |      | X |   |
| <i>L. ovata ventricosa</i>        |   |    |    |      | X |   |
| <i>Plagiola triquetra</i>         |   |    |    |      |   |   |
| <i>Arcidens confragosus</i>       |   |    |    |      |   |   |
| <i>Lasmigona complanata</i>       |   |    |    |      |   |   |
| <i>L. costata</i>                 |   |    |    |      |   |   |
| <i>L. compressa</i>               |   |    |    |      |   |   |
| <i>Alasmidonta marginata</i>      |   |    |    |      |   |   |
| <i>A. viridis</i>                 |   |    |    |      |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |    |    |      |   |   |
| <i>Anodontoides ferussacianus</i> |   |    |    |      |   |   |
| <i>Anodonta suborbiculata</i>     |   |    |    |      |   |   |
| <i>A. imbecillis</i>              |   |    |    |      |   |   |
| <i>A. grandis</i>                 |   |    |    |      |   |   |
| <i>Strophitus undulatus</i>       |   |    |    |      |   |   |

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|   |   |     |     |       |    |   |
|---|---|-----|-----|-------|----|---|
| 8 | 9 | 418 | 427 | 100.0 | 10 | 0 |
|---|---|-----|-----|-------|----|---|

Notes:

## EXHIBIT 141

## 45. Weaver Bottoms Complex

Site data: Exhibit(s) 42

Map(s): Exhibit(s) 201, 228

|                               | A | J   | T   | %    | R | H |
|-------------------------------|---|-----|-----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |     |     |      |   |   |
| <i>Quadrula metanevra</i>     |   |     |     |      |   |   |
| <i>Q. quadrula</i>            |   |     |     |      |   |   |
| <i>Q. nodulata</i>            |   |     |     |      |   |   |
| <i>Q. pustulosa</i>           |   |     |     |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |     |     |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |     |     |      |   |   |
| X <i>Fusconaia flava</i>      | 1 |     | 1   | 0.4  |   |   |
| <i>F. ebena</i>               |   |     |     |      |   |   |
| <i>Megalonaias gigantea</i>   |   |     |     |      |   |   |
| X <i>Amblema plicata</i>      | 1 | 1   | 2   | 0.9  |   |   |
| <i>Plethobasus cyphus</i>     |   |     |     |      |   |   |
| <i>Pleurobema cordatum</i>    |   |     |     |      |   |   |
| <i>Elliptio crassidens</i>    |   |     |     |      |   |   |
| <i>E. dilatata</i>            |   |     |     |      |   |   |
| <i>Obliquaria reflexa</i>     |   |     |     |      |   |   |
| <i>Proptera alata</i>         |   |     |     |      |   |   |
| <i>P. laevissima</i>          |   |     |     |      |   |   |
| <i>P. capax</i>               |   |     |     |      |   |   |
| <i>P. purpurata</i>           |   |     |     |      |   |   |
| X <i>Leptodea fragilis</i>    |   | 2   | 2   | 0.9  |   |   |
| <i>L. leptodon</i>            |   |     |     |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |     |     |      |   |   |
| <i>Truncilla truncata</i>     |   |     |     |      |   |   |
| X <i>T. donaciformis</i>      |   | 214 | 214 | 95.1 |   |   |
| <i>Obovaria olivaria</i>      |   |     |     |      |   |   |
| <i>Actinonaias carinata</i>   |   |     |     |      |   |   |
| <i>A. ellipsiformis</i>       |   |     |     |      |   |   |

|                                   | A | J   | T   | %     | R | H |
|-----------------------------------|---|-----|-----|-------|---|---|
| <i>Ligumia recta</i>              |   |     |     |       |   |   |
| <i>L. subrostrata</i>             |   |     |     |       |   |   |
| X <i>Carunculina parva</i>        |   | 5   | 5   | 2.2   |   |   |
| <i>Lampsilis teres</i>            |   |     |     |       |   |   |
| <i>L. higginsii</i>               |   |     |     |       |   |   |
| <i>L. radiata siliquoides</i>     |   |     |     |       |   |   |
| X <i>L. ovata ventricosa</i>      | 1 |     | 1   | 0.4   |   |   |
| <i>Plagiola triquetra</i>         |   |     |     |       |   |   |
| <i>Arcidens confragosus</i>       |   |     |     |       |   |   |
| <i>Lasmigona complanata</i>       |   |     |     |       |   |   |
| <i>L. costata</i>                 |   |     |     |       |   |   |
| <i>L. compressa</i>               |   |     |     |       |   |   |
| <i>Alasmidonta marginata</i>      |   |     |     |       |   |   |
| <i>A. viridis</i>                 |   |     |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |     |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |   |     |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |   |     |     |       |   |   |
| <i>A. imbecillis</i>              |   |     |     |       |   |   |
| <i>A. grandis</i>                 |   |     |     |       |   |   |
| <i>Strophitus undulatus</i>       |   |     |     |       |   |   |
| <hr/>                             |   |     |     |       |   |   |
| 6                                 | 3 | 222 | 225 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 142

## 46. Locks and Dam 5 Culvert Construction

Site data: Exhibit(s) 43

Map(s): Exhibit(s) 201, 202, 229

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 5  |   | 5  | 13.5 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 2  |   | 2  | 5.4  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 18 |   | 18 | 48.6 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1  |   | 1  | 2.7  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| X <i>P. laevissima</i>        | 1  |   | 1  | 2.7  |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 1  |   | 1  | 2.7  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciformis</i>      | 1  |   | 1  | 2.7  |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|       | <i>Ligumia recta</i>              |    |   |      |       |     |
|-------|-----------------------------------|----|---|------|-------|-----|
|       | <i>L. subrostrata</i>             |    |   |      |       |     |
| X     | <i>Carunculina parva</i>          | 5  | 5 | 13.5 |       |     |
|       | <i>Lampsilis teres</i>            |    |   |      |       |     |
|       | <i>L. higginsii</i>               |    |   |      |       |     |
| X     | <i>L. radiata siliquidea</i>      | 1  | 1 | 2.7  |       |     |
|       | <i>L. ovata ventricosa</i>        |    |   |      |       |     |
|       | <i>Plagiola triquetra</i>         |    |   |      |       |     |
| X     | <i>Arcidens confragosus</i>       | 1  | 1 | 2.7  |       |     |
|       | <i>Lasmigona complanata</i>       |    |   |      |       |     |
|       | <i>L. costata</i>                 |    |   |      |       |     |
|       | <i>L. compressa</i>               |    |   |      |       |     |
|       | <i>Alasmidonta marginata</i>      |    |   |      |       |     |
|       | <i>A. viridis</i>                 |    |   |      |       |     |
|       | <i>Simpsoniconcha ambigua</i>     |    |   |      |       |     |
|       | <i>Anodontoidea ferussacianus</i> |    |   |      |       |     |
|       | <i>Anodonta suborbiculata</i>     |    |   |      |       |     |
| X     | <i>A. imbecillis</i>              | 1  | 1 | 2.7  |       |     |
|       | <i>A. grandis</i>                 |    |   |      | X     |     |
|       | <i>Strophitus undulatus</i>       |    |   |      |       |     |
| <hr/> |                                   |    |   |      |       |     |
| 11    |                                   | 37 | 0 | 37   | 100.0 | 1 0 |

Notes:

## EXHIBIT 143

Pool 5A

Site data: Exhibit(s) 43-49

Map(s): Exhibit(s) 202

|  | A  | J | T  | %    | R              | H |
|--|----|---|----|------|----------------|---|
| <i>Cumberlandia monodonta</i>              |    |   |    |      |                |   |
| <i>Quadrula metanevra</i>                  |    |   |    |      | X <sup>W</sup> |   |
| <i>Q. quadrula</i>                         |    |   |    |      |                |   |
| <i>Q. nodulata</i>                         |    |   |    |      |                |   |
| X <i>Q. pustulosa</i>                      | 13 |   | 13 | 20.0 |                |   |
| <i>Tritogonia verrucosa</i>                |    |   |    |      |                |   |
| <i>Cyclonaias tuberculata</i>              |    |   |    |      |                |   |
| X <i>Fusconaia flava</i>                   | 9  |   | 9  | 13.8 |                |   |
| <i>F. ebena</i>                            |    |   |    |      |                |   |
| <i>Megalonaias gigantea</i>                |    |   |    |      |                |   |
| X <i>Ambelma plicata</i>                   | 18 |   | 18 | 27.7 |                |   |
| <i>Plethobasus cyphus</i>                  |    |   |    |      |                |   |
| <i>Pleurobema cordatum</i>                 |    |   |    |      |                |   |
| <i>Elliptio crassidens</i>                 |    |   |    |      |                |   |
| <i>E. dilatata</i>                         |    |   |    |      |                |   |
| X <i>Obliquaria reflexa</i>                | 4  |   | 4  | 6.2  |                |   |
| <i>Proptera alata</i>                      |    |   |    |      | X <sup>W</sup> |   |
| X <i>P. laevissima</i>                     | 1  |   | 1  | 1.5  |                |   |
| <i>P. capax</i>                            |    |   |    |      |                |   |
| <i>P. purpurata</i>                        |    |   |    |      |                |   |
| X <sup>W</sup> <i>Leptodea fragilis</i>    |    |   |    |      |                |   |
| <i>L. leptodon</i>                         |    |   |    |      |                |   |
| X <sup>W</sup> <i>Ellipsaria lineolata</i> |    |   |    |      |                |   |
| X <i>Truncilla truncata</i>                | 1  |   | 1  | 1.5  |                |   |
| X <i>T. donaciformis</i>                   | 10 | 4 | 14 | 21.5 |                |   |
| X <i>Obovaria olivaria</i>                 | 1  |   | 1  | 1.5  |                |   |
| <i>Actinonaias carinata</i>                |    |   |    |      |                |   |
| <i>A. ellipsiformis</i>                    |    |   |    |      |                |   |

|   | A  | J | T  | %     | R | H              |
|---|----|---|----|-------|---|----------------|
| <i>Ligumia recta</i>                          |    |   |    |       |   |                |
| <i>L. subrostrata</i>                         |    |   |    |       |   | X <sup>A</sup> |
| X <i>Carunculina parva</i>                    |    | 2 | 2  | 3.1   |   |                |
| <i>Lampsilis teres</i>                        |    |   |    |       |   |                |
| <i>L. higginsii</i>                           |    |   |    |       |   |                |
| X <sup>W</sup> <i>L. radiata siliquioidea</i> |    |   |    |       |   |                |
| <i>L. ovata ventricosa</i>                    |    |   |    |       |   |                |
| <i>Plagiola triquetra</i>                     |    |   |    |       |   |                |
| <i>Arcidens confragosus</i>                   |    |   |    |       |   |                |
| <i>Lasmigona complanata</i>                   |    |   |    |       |   |                |
| <i>L. costata</i>                             |    |   |    |       |   |                |
| <i>L. compressa</i>                           |    |   |    |       |   |                |
| <i>Alasmidonta marginata</i>                  |    |   |    |       |   |                |
| <i>A. viridis</i>                             |    |   |    |       |   | X <sup>A</sup> |
| <i>Simpsoniconcha ambigua</i>                 |    |   |    |       |   |                |
| <i>Anodontoides ferussacianus</i>             |    |   |    |       |   |                |
| <i>Anodonta suborbiculata</i>                 |    |   |    |       |   |                |
| <i>A. imbecillis</i>                          |    |   |    |       |   |                |
| X <i>A. grandis</i>                           | 2  |   | 2  | 3.1   |   |                |
| X <sup>W</sup> <i>Strophitus undulatus</i>    |    |   |    |       |   |                |
| 14  | 59 | 6 | 65 | 100.0 | 2 | 2              |

Notes:

## EXHIBIT 144

## 47. Locks and Dam 5 Lower Approach

Site data: Exhibit(s) 44

Map(s): Exhibit(s) 202, 229

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| <i>Q. pustulosa</i>           |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 1 |   | 1 | 20.0 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| <i>Amblema plicata</i>        |   |   |   |      |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1 |   | 1 | 20.0 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| X <i>Truncilla truncata</i>   | 1 |   | 1 | 20.0 |   |   |
| X <i>T. donaciformis</i>      | 2 |   | 2 | 40.0 |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |



A J T S R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. nodulata silimoides*  
*L. ovata ventricosa*  
*Blasidula triquetra*

*Lampsilis compressa*  
*Lampsilis complanata*  
*L. costata*  
*L. compressa*

*Alasmodonta marginata*  
*A. viridis*  
*Silpermodonta arhina*  
*Anodontolites ferussacianus*

*Anodonta suborbiculata*  
*A. lineatilis*  
*A. grandis*  
*Anodonta imbecilis*

1

7 11 5 100.0 6

Notes:

## EXHIBIT 145

48. Island 58, 49. Island 58 Bank Repair, 50. Fountain City

Site data: Exhibit(s) 45

Map(s): Exhibit(s) 202, 230

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 7  |   | 7  | 18.4 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 5  |   | 5  | 13.2 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Ambelma plicata</i>      | 10 |   | 10 | 26.3 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 3  |   | 3  | 7.9  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciformis</i>      | 7  | 4 | 11 | 28.9 |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arctidens confragosus*  
*Lasmygona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniiconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

X

2 2 5.5

6

34 4 38 1 10 0 0

Notes:

EXHIBIT 146

51. Fountain City Service Base

Site data: Exhibit(s) 46

Map(s): Exhibit(s) 202, 230

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaia flava*

*F. ebena*  
*Megalonaias gigantea*  
*Ambelma plicata*  
*Plethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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0

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0

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Notes:

## EXHIBIT 147

## 52. Fountain City Small Boat Harbor

Site data: Exhibit(s) 47

Map(s): Exhibit(s) 202, 230

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 11.1 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 3 |   | 3 | 33.3 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 4 |   | 4 | 44.4 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 11.1 |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

|  | A | J | T | % | R | H |
|--|---|---|---|---|---|---|
|--|---|---|---|---|---|---|

*Ligumia recta*  
*L. subrostrata*  
*Camunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontooides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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4

9

0

9

100.0

0

0

Notes:

# EXHIBIT 148

53. Betsy Slough, 54. Betsy Slough Bank Repair, 55. Wilds Bend

Site data: Exhibit(s) 48

Map(s): Exhibit(s) 202, 230

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 5 |   | 5 | 55.6 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaias flava</i>       |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 3 |   | 3 | 33.3 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 11.1 |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |



A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

3

9

0

9

100.0

0

0

Notes:

## EXHIBIT 149

## 56. Locks and Dam 5a Upper Approach

Site data: Exhibit(s) 49

Map(s): Exhibit(s) 202, 231

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <hr/>                         |   |   |   |      |   |   |
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| <i>Q. pustulosa</i>           |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaias flava</i>       |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblesma plicata</i>     | 1 |   | 1 | 25.0 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| X <i>P. laevissima</i>        | 1 |   | 1 | 25.0 |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

|                                   | A | P | F | E     | R | H |
|-----------------------------------|---|---|---|-------|---|---|
| <i>Ligumia recta</i>              |   |   |   |       |   |   |
| <i>L. subrostrata</i>             |   |   |   |       |   |   |
| X <i>Carunculina parva</i>        |   | 2 | 2 | 50.0  |   |   |
| <i>Lampsilis teres</i>            |   |   |   |       |   |   |
| <i>L. higginsii</i>               |   |   |   |       |   |   |
| <i>L. radiata siliquoidea</i>     |   |   |   |       |   |   |
| <i>L. ovata ventricosa</i>        |   |   |   |       |   |   |
| <i>Plagiola triquetra</i>         |   |   |   |       |   |   |
| <i>Arcidens confragosus</i>       |   |   |   |       |   |   |
| <i>Lasmigona complanata</i>       |   |   |   |       |   |   |
| <i>L. costata</i>                 |   |   |   |       |   |   |
| <i>L. compressa</i>               |   |   |   |       |   |   |
| <i>Alasmidonta marginata</i>      |   |   |   |       |   |   |
| <i>A. viridis</i>                 |   |   |   |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |   |   |       |   |   |
| <i>Anodontoides ferussacianus</i> |   |   |   |       |   |   |
| <i>Anodonta suborbiculata</i>     |   |   |   |       |   |   |
| <i>A. imbecillis</i>              |   |   |   |       |   |   |
| <i>A. grandis</i>                 |   |   |   |       |   |   |
| <i>Strophitus undulatus</i>       |   |   |   |       |   |   |
| <hr/>                             |   |   |   |       |   |   |
| 3                                 | 2 | 2 | 4 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 150

## Pool 6

Site data: Exhibit(s) 50-53

Map(s): Exhibit(s) 202

|  | A    | J | T    | %    | R              | H              |
|--|------|---|------|------|----------------|----------------|
| <i>Cumberlandia monodonta</i>              |      |   |      |      |                |                |
| X <i>Quadrula metanevra</i>                | 7    |   | 7    | 0.2  |                | X <sup>D</sup> |
| X <sup>CC</sup> <i>Q. quadrula</i>         |      |   |      |      |                |                |
| <i>Q. nodulata</i>                         |      |   |      |      |                |                |
| X <i>Q. pustulosa</i>                      | 147  |   | 147  | 5.0  | X <sup>F</sup> | X <sup>D</sup> |
| <i>Tritogonia verrucosa</i>                |      |   |      |      | X <sup>W</sup> | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i>              |      |   |      |      |                |                |
| X <i>Fusconaia flava</i>                   | 193  |   | 193  | 6.6  | X <sup>F</sup> | X <sup>D</sup> |
| X <i>F. ebena</i>                          | 1    |   | 1    | <0.1 | X <sup>F</sup> | X <sup>D</sup> |
| <i>Megalonaias gigantea</i>                |      |   |      |      |                | X <sup>D</sup> |
| X <i>Ambelma plicata</i>                   | 769  |   | 769  | 26.3 | X <sup>F</sup> | X <sup>D</sup> |
| <i>Plethobasus cyphus</i>                  |      |   |      |      |                |                |
| X <sup>CC</sup> <i>Pleurobema cordatum</i> |      |   |      |      | X <sup>W</sup> |                |
| X <sup>W</sup> <i>Elliptio crassidens</i>  |      |   |      |      |                | X <sup>D</sup> |
| X <i>E. dilatata</i>                       |      |   |      |      | X <sup>F</sup> | X <sup>D</sup> |
| X <i>Obliquaria reflexa</i>                | 221  |   | 221  | 7.5  | X <sup>F</sup> |                |
| X <i>Proptera alata</i>                    | 5    |   | 5    | 0.2  |                | X <sup>D</sup> |
| X <i>P. laevissima</i>                     | 32   |   | 32   | 1.1  |                |                |
| <i>P. capax</i>                            |      |   |      |      |                |                |
| <i>P. purpurata</i>                        |      |   |      |      |                |                |
| X <i>Leptodea fragilis</i>                 | 7    |   | 7    | 0.2  |                |                |
| <i>L. leptodon</i>                         |      |   |      |      |                |                |
| <i>Ellipsaria lineolata</i>                |      |   |      |      | X <sup>W</sup> |                |
| X <i>Truncilla truncata</i>                | 4    |   | 4    | 0.1  |                | X <sup>D</sup> |
| X <i>T. donaciformis</i>                   | 1395 |   | 1395 | 47.6 |                |                |
| X <i>Obovaria olivaria</i>                 | 10   |   | 10   | 0.3  | X <sup>F</sup> | X <sup>D</sup> |
| <i>Actinonaius carinata</i>                |      |   |      |      |                | X <sup>D</sup> |
| <i>A. ellipsiformis</i>                    |      |   |      |      |                |                |

|                                   | A    | J | T    | %     | R              | H              |
|-----------------------------------|------|---|------|-------|----------------|----------------|
| X <i>Ligumia recta</i>            | 6    | 1 | 7    | 0.2   | X <sup>F</sup> | X <sup>D</sup> |
| <i>L. subrostrata</i>             |      |   |      |       |                | X <sup>U</sup> |
| X <i>Carunculina parva</i>        | 37   |   | 37   | 1.3   |                |                |
| <i>Lampsilis teres</i>            |      |   |      |       | X <sup>F</sup> |                |
| <i>L. higginsii</i>               |      |   |      |       |                |                |
| <i>L. radiata siliquoides</i>     |      |   |      |       |                | X <sup>D</sup> |
| X <i>L. ovata ventricosa</i>      | 62   |   | 62   | 2.1   | X <sup>F</sup> | X <sup>D</sup> |
| <i>Plagiola triquetra</i>         |      |   |      |       |                |                |
| <i>Arcidens confragosus</i>       |      |   |      |       |                |                |
| X <i>Lasmigona complanata</i>     | 1    |   | 1    | <0.1  |                | X <sup>D</sup> |
| <i>L. costata</i>                 |      |   |      |       |                | X <sup>D</sup> |
| <i>L. compressa</i>               |      |   |      |       |                |                |
| <i>Alasmidonta marginata</i>      |      |   |      |       |                | X <sup>D</sup> |
| <i>A. viridis</i>                 |      |   |      |       |                |                |
| <i>Simpsoniconcha ambigua</i>     |      |   |      |       |                |                |
| <i>Anodontoides ferussacianus</i> |      |   |      |       |                |                |
| <i>Anodonta suborbiculata</i>     |      |   |      |       |                |                |
| X <i>A. imbecillis</i>            | 4    | 1 | 5    | 0.2   |                |                |
| X <i>A. grandis</i>               | 25   |   | 25   | 0.9   | X <sup>F</sup> | X <sup>D</sup> |
| <i>Strophitus undulatus</i>       |      |   |      |       |                |                |
| <hr/>                             |      |   |      |       |                |                |
| 21                                | 2926 | 2 | 2928 | 100.0 | 14             | 21             |

Notes:

# EXHIBIT 151

## 57. Locks and Dam 5A Lower Approach

Site data: Exhibit(s) 50

Map(s): Exhibit(s) 202, 231

|                               | A | J | T | %     | R | H |
|-------------------------------|---|---|---|-------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |       |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |       |   |   |
| <i>Q. quadrula</i>            |   |   |   |       |   |   |
| <i>Q. nodulata</i>            |   |   |   |       |   |   |
| <i>Q. pustulosa</i>           |   |   |   |       |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |       |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |       |   |   |
| X <i>Fusconaia flava</i>      | 1 |   | 1 | 100.0 |   |   |
| <i>F. ebena</i>               |   |   |   |       |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |       |   |   |
| <i>Ambelma plicata</i>        |   |   |   |       |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |       |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |       |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |       |   |   |
| <i>E. dilatata</i>            |   |   |   |       |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |       |   |   |
| <i>Proptera alata</i>         |   |   |   |       |   |   |
| <i>P. laevissima</i>          |   |   |   |       |   |   |
| <i>P. capax</i>               |   |   |   |       |   |   |
| <i>P. purpurata</i>           |   |   |   |       |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |       |   |   |
| <i>L. leptodon</i>            |   |   |   |       |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |       |   |   |
| <i>Truncilla truncata</i>     |   |   |   |       |   |   |
| <i>T. donaciformis</i>        |   |   |   |       |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |       |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |       |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |       |   |   |

AD-A097 003

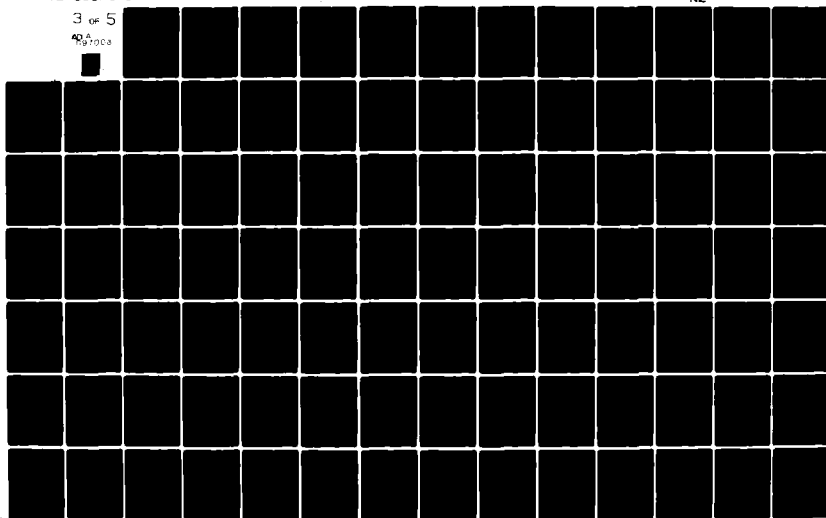
ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA PA DIV OF--ETC F/G 6/6  
FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDAE) OF THE UPPER--ETC(U)  
SEP 80 S L FULLER

UNCLASSIFIED 79-24F-VOL-2

NL

3 of 5

40  
197003



A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

1

1 0 1 100.0 0 0

Notes:



# EXHIBIT 152

## 58. Winona Commercial Harbor and Small Boat Harbors

Site data: Exhibit(s) 51

Map(s): Exhibit(s) 202, 232

|                                 | A | J | T | %    | R | H |
|---------------------------------|---|---|---|------|---|---|
| X <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| X <i>Quadrula metanevra</i>     | 1 |   | 1 | 12.5 |   |   |
| <i>Q. quadrula</i>              |   |   |   |      |   |   |
| <i>Q. nodulata</i>              |   |   |   |      |   |   |
| <i>Q. pustulosa</i>             |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>     |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i>   |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>        | 1 |   | 1 | 12.5 |   |   |
| <i>F. ebena</i>                 |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>     |   |   |   |      |   |   |
| X <i>Amblema plicata</i>        | 3 |   | 3 | 37.5 |   |   |
| <i>Plethobasus cyphus</i>       |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>      |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>      |   |   |   |      |   |   |
| <i>E. dilatata</i>              |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>     | 3 |   | 3 | 37.5 |   |   |
| <i>Proptera alata</i>           |   |   |   |      |   |   |
| <i>P. laevissima</i>            |   |   |   |      |   |   |
| <i>P. capax</i>                 |   |   |   |      |   |   |
| <i>P. purpurata</i>             |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>        |   |   |   |      |   |   |
| <i>L. leptodon</i>              |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>     |   |   |   |      |   |   |
| <i>Truncilla truncata</i>       |   |   |   |      |   |   |
| <i>T. donaciformis</i>          |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>        |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>     |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>         |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmsgona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

4

8 0 8 100.0 0 0

Notes:

## EXHIBIT 153

## 59. Winona Lower Railroad Bridge

Site data: Exhibit(s) 52

Map(s): Exhibit(s) 202, 232

|                                 | A   | J | T   | %    | R | H |
|---------------------------------|-----|---|-----|------|---|---|
| X <i>Cumberlandia monodonta</i> |     |   |     |      |   |   |
| X <i>Quadrula metanevra</i>     | 1   |   | 1   | 0.1  |   |   |
| <i>Q. quadrula</i>              |     |   |     |      |   |   |
| <i>Q. nodulata</i>              |     |   |     |      |   |   |
| X <i>Q. pustulosa</i>           | 96  |   | 96  | 6.0  |   |   |
| <i>Tritogonia verrucosa</i>     |     |   |     |      |   |   |
| <i>Cyclonaias tuberculata</i>   |     |   |     |      |   |   |
| X <i>Fusconaia flava</i>        | 109 |   | 109 | 6.8  |   |   |
| <i>F. ebena</i>                 |     |   |     |      |   |   |
| <i>Megalonaias gigantea</i>     |     |   |     |      |   |   |
| X <i>Ambelma plicata</i>        | 266 |   | 266 | 16.6 |   |   |
| <i>Plethobasus cyphus</i>       |     |   |     |      |   |   |
| <i>Pleurobema cordatum</i>      |     |   |     |      |   |   |
| <i>Elliptio crassidens</i>      |     |   |     |      |   |   |
| <i>E. dilatata</i>              |     |   |     |      |   |   |
| X <i>Obliquaria reflexa</i>     | 119 |   | 119 | 7.4  |   |   |
| X <i>Proptera alata</i>         | 1   |   | 1   | 0.1  |   |   |
| X <i>P. laevissima</i>          | 11  |   | 11  | 0.7  |   |   |
| <i>P. capax</i>                 |     |   |     |      |   |   |
| <i>P. purpurata</i>             |     |   |     |      |   |   |
| X <i>Leptodea fragilis</i>      | 1   |   | 1   | 0.1  |   |   |
| <i>L. leptodon</i>              |     |   |     |      |   |   |
| <i>Ellipsaria lineolata</i>     |     |   |     |      |   |   |
| X <i>Truncilla truncata</i>     | 2   |   | 2   | 0.1  |   |   |
| X <i>T. donaciformis</i>        | 920 |   | 920 | 57.4 |   |   |
| X <i>Obovaria olivaria</i>      | 9   |   | 9   | 0.6  |   |   |
| <i>Actinonaias carinata</i>     |     |   |     |      |   |   |
| <i>A. ellipsiformis</i>         |     |   |     |      |   |   |

|                                    | A  | J | T  | %   | R | H |
|------------------------------------|----|---|----|-----|---|---|
| X <i>Ligumia recta</i>             | 1  | 1 | 2  | 0.1 |   |   |
| <i>L. subrostrata</i>              |    |   |    |     |   |   |
| X <i>Carinaulina parva</i>         | 19 |   | 19 | 1.2 |   |   |
| <i>Lampsilis teres</i>             |    |   |    |     |   |   |
| <i>L. higginsii</i>                |    |   |    |     |   |   |
| <i>L. radiata siliquoidea</i>      |    |   |    |     |   |   |
| X <i>L. ovata ventricosa</i>       | 26 |   | 26 | 1.6 |   |   |
| <i>Plagiola triquetra</i>          |    |   |    |     |   |   |
| <i>Arcidens confragosus</i>        |    |   |    |     |   |   |
| <i>Lasmigona complanata</i>        |    |   |    |     |   |   |
| <i>L. costata</i>                  |    |   |    |     |   |   |
| <i>L. compressa</i>                |    |   |    |     |   |   |
| <i>Alasmidonta marginata</i>       |    |   |    |     |   |   |
| <i>A. viridis</i>                  |    |   |    |     |   |   |
| <i>Simpsoniacantha ambigua</i>     |    |   |    |     |   |   |
| <i>Anodontolites femissacianus</i> |    |   |    |     |   |   |
| <i>Anodonta suborbiculata</i>      |    |   |    |     |   |   |
| X <i>A. imbecillia</i>             | 5  |   | 5  | 0.2 |   |   |
| X <i>A. grandis</i>                | 17 |   | 17 | 1.1 |   |   |
| <i>Strophitus undulatus</i>        |    |   |    |     |   |   |

---

|    |      |   |      |       |   |   |
|----|------|---|------|-------|---|---|
| 16 | 1601 | 1 | 1602 | 100.0 | 0 | 0 |
|----|------|---|------|-------|---|---|

Notes:

EXHIBIT 154  
60. Gravel Point

Site data: Exhibit(s) 53

Map(s): Exhibit(s) 202, 232

|                               | A   | J | T   | %    | R | H |
|-------------------------------|-----|---|-----|------|---|---|
| <i>Cumberlandia monodonta</i> |     |   |     |      |   |   |
| X <i>Quadrula metanevra</i>   | 5   |   | 5   | 0.4  |   |   |
| <i>Q. quadrula</i>            |     |   |     |      |   |   |
| <i>Q. nodulata</i>            |     |   |     |      |   |   |
| X <i>Q. pustulosa</i>         | 51  |   | 51  | 3.9  |   |   |
| <i>Tritogonia verrucosa</i>   |     |   |     |      |   |   |
| <i>Cyclonaias tuberculata</i> |     |   |     |      |   |   |
| X <i>Fusconaia flava</i>      | 82  |   | 82  | 6.2  |   |   |
| X <i>F. ebena</i>             | 1   |   | 1   | 0.1  |   |   |
| <i>Megalonaias gigantea</i>   |     |   |     |      |   |   |
| X <i>Amblema plicata</i>      | 500 |   | 500 | 38.0 |   |   |
| <i>Plethobasus cyphus</i>     |     |   |     |      |   |   |
| <i>Pleurobema cordatum</i>    |     |   |     |      |   |   |
| <i>Elliptio crassidens</i>    |     |   |     |      |   |   |
| <i>E. dilatata</i>            |     |   |     |      |   |   |
| X <i>Obliquaria reflexa</i>   | 99  |   | 99  | 7.5  |   |   |
| X <i>Proptera alata</i>       | 4   |   | 4   | 0.3  |   |   |
| X <i>P. laevissima</i>        | 21  |   | 21  | 1.6  |   |   |
| <i>P. capax</i>               |     |   |     |      |   |   |
| <i>P. purpurata</i>           |     |   |     |      |   |   |
| X <i>Leptodea fragilis</i>    | 6   |   | 6   | 0.5  |   |   |
| <i>L. leptodon</i>            |     |   |     |      |   |   |
| <i>Ellipsaria lineolata</i>   |     |   |     |      |   |   |
| X <i>Truncilla truncata</i>   | 2   |   | 2   | 0.2  |   |   |
| X <i>T. donaciformis</i>      | 475 |   | 475 | 36.1 |   |   |
| X <i>Obovaria olivaria</i>    | 1   |   | 1   | 0.1  |   |   |
| <i>Actinonaias carinata</i>   |     |   |     |      |   |   |
| <i>A. ellipsiformis</i>       |     |   |     |      |   |   |

|       |                                   |      |    |      | R     | H |
|-------|-----------------------------------|------|----|------|-------|---|
| X     | <i>Ligumia recta</i>              | 5    | 5  | 0.4  |       |   |
|       | <i>L. subrostrata</i>             |      |    |      |       |   |
| X     | <i>Carunculina parva</i>          | 18   | 18 | 1.4  |       |   |
|       | <i>Lampsilis teres</i>            |      |    |      |       |   |
|       | <i>L. higginsii</i>               |      |    |      |       |   |
|       | <i>L. radiata siliquoidea</i>     |      |    |      |       |   |
| X     | <i>L. ovata ventricosa</i>        | 36   | 36 | 2.7  |       |   |
|       | <i>Plagiola triquetra</i>         |      |    |      |       |   |
|       | <i>Arcidens confragosus</i>       |      |    |      |       |   |
| X     | <i>Lasmigona complanata</i>       | 1    | 1  | 0.1  |       |   |
|       | <i>L. costata</i>                 |      |    |      |       |   |
|       | <i>L. compressa</i>               |      |    |      |       |   |
|       | <i>Alasmidonta marginata</i>      |      |    |      |       |   |
|       | <i>A. viridis</i>                 |      |    |      |       |   |
|       | <i>Simpsoniconcha arbigua</i>     |      |    |      |       |   |
|       | <i>Anodontoides ferussacianus</i> |      |    |      |       |   |
|       | <i>Anodonta suborbiculata</i>     |      |    |      |       |   |
| X     | <i>A. imbecillis</i>              | 1    | 1  | 0.2  |       |   |
| X     | <i>A. grandis</i>                 | 8    | 8  | 0.6  |       |   |
|       | <i>Strophitus undulatus</i>       |      |    |      |       |   |
| <hr/> |                                   |      |    |      |       |   |
| 18    |                                   | 1316 | 1  | 1317 | 100.0 | 0 |

Notes:

## EXHIBIT 155

## Pool 7

Site data: Exhibit(s) 54-57

Map(s): Exhibit(s) 203

|  | A  | J  | T  | %    | R              | H              |
|--|----|----|----|------|----------------|----------------|
| <i>Cumberlandia monodonta</i>              |    |    |    |      | X <sup>H</sup> | X <sup>D</sup> |
| <i>Quadrula metanevra</i>                  |    |    |    |      | X <sup>H</sup> |                |
| <i>Q. quadrula</i>                         |    |    |    |      | X <sup>H</sup> |                |
| <i>Q. nodulata</i>                         |    |    |    |      |                |                |
| X <i>Q. pustulosa</i>                      | 44 |    | 44 | 25.1 | X <sup>H</sup> | X <sup>D</sup> |
| <i>Tritogonia verrucosa</i>                |    |    |    |      | X <sup>H</sup> | X <sup>D</sup> |
| <i>Cyclonaias tuberculata</i>              |    |    |    |      |                |                |
| X <i>Fusconaias flava</i>                  | 8  |    | 8  | 4.6  | X <sup>H</sup> |                |
| <i>F. ebena</i>                            |    |    |    |      |                | X <sup>D</sup> |
| X <i>Megalonaias gigantea</i>              |    |    |    |      | X <sup>W</sup> |                |
| <i>Amblema plicata</i>                     | 42 |    | 42 | 24.0 | X <sup>H</sup> | X <sup>D</sup> |
| <i>Plethobasus cyphus</i>                  |    |    |    |      |                | X <sup>D</sup> |
| <i>Pleurobema cordatum</i>                 |    |    |    |      | X <sup>W</sup> |                |
| X <sup>W</sup> <i>Elliptio crassidens</i>  |    |    |    |      |                | X <sup>H</sup> |
| X <i>E. dilatata</i>                       |    |    |    |      | X <sup>H</sup> |                |
| X <i>Obliquaria reflexa</i>                | 6  |    | 6  | 3.4  | X <sup>H</sup> | X <sup>D</sup> |
| X <i>Proptera alata</i>                    | 1  |    | 1  | 0.6  | X <sup>H</sup> | X <sup>D</sup> |
| X <i>P. laevissima</i>                     | 3  |    | 3  | 1.7  | X <sup>H</sup> |                |
| <i>P. capax</i>                            |    |    |    |      |                |                |
| <i>P. purpurata</i>                        |    |    |    |      |                |                |
| X <sup>S</sup> <i>Leptodea fragilis</i>    |    |    |    |      | X <sup>H</sup> |                |
| <i>L. leptodon</i>                         |    |    |    |      |                |                |
| X <sup>W</sup> <i>Ellipsaria lineolata</i> |    |    |    |      | X <sup>F</sup> |                |
| X <i>Truncilla truncata</i>                | 2  |    | 2  | 1.1  | X <sup>H</sup> |                |
| X <i>T. donaciformis</i>                   | 12 | 29 | 41 | 23.4 | X <sup>H</sup> |                |
| X <i>Obovaria olivaria</i>                 | 22 |    | 22 | 12.6 | X <sup>H</sup> | X <sup>D</sup> |
| <i>Actinonaias carinata</i>                |    |    |    |      | X <sup>W</sup> | X <sup>D</sup> |
| <i>A. ellipsiformis</i>                    |    |    |    |      |                |                |

|   | A   | J  | T   | %     | R              | H              |
|---|-----|----|-----|-------|----------------|----------------|
| X <i>Ligumia recta</i>                        | 1   |    | 1   | 0.6   | X <sup>H</sup> | X <sup>D</sup> |
| <i>L. subrostrata</i>                         |     |    |     |       |                |                |
| X <i>Carunculina parva</i>                    | 2   |    | 2   | 1.1   | X <sup>H</sup> |                |
| <i>Lampsilis teres</i>                        |     |    |     |       |                |                |
| <i>L. higginsii</i>                           |     |    |     |       | X <sup>F</sup> | X <sup>D</sup> |
| X <sup>M</sup> <i>L. radiata siliquioidea</i> |     |    |     |       | X <sup>H</sup> | X <sup>D</sup> |
| X <sup>S</sup> <i>L. ovata ventricosa</i>     |     |    |     |       | X <sup>H</sup> | X <sup>D</sup> |
| <i>Plagiola triquetra</i>                     |     |    |     |       |                |                |
| <i>Arcidens confragosus</i>                   |     |    |     |       |                |                |
| X <i>Lasmigona complanata</i>                 | 1   |    | 1   | 0.6   |                |                |
| <i>L. costata</i>                             |     |    |     |       |                |                |
| <i>L. compressa</i>                           |     |    |     |       |                |                |
| <i>Alasmidonta marginata</i>                  |     |    |     |       |                | X <sup>W</sup> |
| <i>A. viridis</i>                             |     |    |     |       |                |                |
| <i>Simpsoniconcha ambigua</i>                 |     |    |     |       |                |                |
| <i>Anodontoides ferussacianus</i>             |     |    |     |       |                |                |
| <i>Anodonta suborbiculata</i>                 |     |    |     |       | X <sup>H</sup> |                |
| <i>A. imbecillis</i>                          |     |    |     |       | X <sup>H</sup> |                |
| X <i>A. grandis</i>                           | 2   |    | 2   | 1.1   |                |                |
| <i>Strophitus undulatus</i>                   |     |    |     |       | X <sup>W</sup> |                |
| 18  | 146 | 29 | 175 | 100.0 | 27             | 16             |

Notes:



## EXHIBIT 156

## 61. Locks and Dam 6 Lower Approach

Site data: Exhibit(s) 54

Map(s): Exhibit(s) 203, 233

|                               | A | J  | T  | %    | R | H |
|-------------------------------|---|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |    |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |    |    |      |   |   |
| <i>Q. quadrula</i>            |   |    |    |      |   |   |
| <i>Q. nodulata</i>            |   |    |    |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |    | 1  | 2.8  |   |   |
| <i>Tritogonia verrucosa</i>   |   |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |    |    |      |   |   |
| X <i>Fusconaia flava</i>      | 1 |    | 1  | 2.8  |   |   |
| <i>F. ebena</i>               |   |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |    |    |      |   |   |
| X <i>Amblema plicata</i>      | 4 |    | 4  | 11.1 |   |   |
| <i>Plethobasus cyphus</i>     |   |    |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |    |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |    |    |      |   |   |
| <i>E. dilatata</i>            |   |    |    |      |   |   |
| <i>Obliquaria reflexa</i>     |   |    |    |      |   |   |
| <i>Proptera alata</i>         |   |    |    |      |   |   |
| X <i>P. laevissima</i>        | 1 |    | 1  | 2.8  |   |   |
| <i>P. capax</i>               |   |    |    |      |   |   |
| <i>P. purpurata</i>           |   |    |    |      |   |   |
| <i>Leptodea fragilis</i>      |   |    |    |      |   |   |
| <i>L. leptodon</i>            |   |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |    |    |      |   |   |
| <i>Truncilla truncata</i>     |   |    |    |      |   |   |
| X <i>T. donaciiformis</i>     |   | 23 | 23 | 63.9 |   |   |
| X <i>Obovaria olivaria</i>    | 4 |    | 4  | 11.1 |   |   |
| <i>Actinonaias carinata</i>   |   |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |    |    |      |   |   |

|                                   | A  | J  | T  | %     | R | H |
|-----------------------------------|----|----|----|-------|---|---|
| <i>Ligumia recta</i>              |    |    |    |       |   |   |
| <i>L. subrostrata</i>             |    |    |    |       |   |   |
| X <i>Carunculina parva</i>        | 2  |    | 2  | 5.6   |   |   |
| <i>Lampsilis teres</i>            |    |    |    |       |   |   |
| <i>L. higginsii</i>               |    |    |    |       |   |   |
| <i>L. radiata siliquoides</i>     |    |    |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |    |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |    |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |    |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |    |    |       |   |   |
| <i>L. costata</i>                 |    |    |    |       |   |   |
| <i>L. compressa</i>               |    |    |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |    |    |       |   |   |
| <i>A. viridis</i>                 |    |    |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |    |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |    |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |    |    |       |   |   |
| <i>A. imbecillis</i>              |    |    |    |       |   |   |
| <i>A. grandis</i>                 |    |    |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |    |    |       |   |   |
| 7                                 | 13 | 25 | 36 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 157

62. Richmond Island

Site data: Exhibit(s) 55

Map(s): Exhibit(s) 203, 233

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 21 |   | 21 | 35.0 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| <i>Fusconaia flava</i>        |    |   |    |      |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 2  |   | 2  | 3.3  |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 4  |   | 4  | 6.7  |   |   |
| X <i>Proptera alata</i>       | 1  |   | 1  | 1.7  |   |   |
| X <i>P. laevissima</i>        | 1  |   | 1  | 1.7  |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1  |   | 1  | 1.7  |   |   |
| X <i>T. donaciformis</i>      | 7  | 5 | 12 | 20.0 |   |   |
| X <i>Obovaria olivaria</i>    | 17 |   | 17 | 28.3 |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Carinaculina parva</i>         |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| X <i>A. grandis</i>               | 1  |   | 1  | 1.7   |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 9                                 | 55 | 5 | 60 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 158

## 63. Queens Bluff

Site data: Exhibit(s) 56

Map(s): Exhibit(s) 203, 233

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 12 |   | 12 | 24.0 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 4  |   | 4  | 8.0  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Ambelma plicata</i>      | 25 |   | 25 | 50.0 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 4.0  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciformis</i>      | 3  | 1 | 4  | 8.0  |   |   |
| X <i>Obovaria olivaria</i>    | 1  |   | 1  | 2.0  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Carunculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| X <i>Lasmigona complanata</i>     | 1  |   | 1  | 2.0   |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| X <i>A. grandis</i>               | 1  |   | 1  | 2.0   |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| <hr/>                             |    |   |    |       |   |   |
| S                                 | 49 | 1 | 50 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 159

## 64. Locks and Dam 7 Upper Approach

Site data: Exhibit(s) 57

Map(s): Exhibit(s) 203, 234

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 10 |   | 10 | 34.5 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 3  |   | 3  | 10.3 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 11 |   | 11 | 37.9 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| <i>Obliquaria reflexa</i>     |    |   |    |      |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| X <i>P. laevissima</i>        | 1  |   | 1  | 3.4  |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1  |   | 1  | 3.4  |   |   |
| X <i>T. donaciformis</i>      | 2  |   | 2  | 6.9  |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| X <i>Ligumia recta</i>            | 1  |   | 1  | 3.4   |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Caminculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquioidea</i>    |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 7                                 | 29 | 0 | 29 | 100.0 | 0 | 0 |

Notes:



## EXHIBIT 160

## Pool 8

Site data: Exhibit(s) 58-66

Map(s): Exhibit(s) 204

|                | A                             | J   | T   | %    | R              | H              |
|----------------|-------------------------------|-----|-----|------|----------------|----------------|
|                | <hr/>                         |     |     |      |                |                |
|                | <i>Cumberlandia monodonta</i> |     |     |      |                |                |
| X              | <i>Quadrula metanevra</i>     | 1   | 1   | 0.1  |                |                |
| X              | <i>Q. quadrula</i>            | 49  | 49  | 6.5  | X <sup>H</sup> |                |
| X              | <i>Q. nodulata</i>            | 5   | 5   | 0.7  | X <sup>H</sup> |                |
| X              | <i>Q. pustulosa</i>           | 82  | 82  | 10.8 | X <sup>H</sup> |                |
|                | <i>Tritogonia verrucosa</i>   |     |     |      | X <sup>W</sup> |                |
|                | <i>Cyclonaias tuberculata</i> |     |     |      |                |                |
| X              | <i>Fusconaia flava</i>        | 64  | 1   | 65   | 8.6            | X <sup>H</sup> |
|                | <i>F. ebena</i>               |     |     |      |                | X <sup>H</sup> |
|                | <i>Megalonaias gigantea</i>   |     |     |      |                |                |
| X              | <i>Amblema plicata</i>        | 190 | 190 | 25.1 | X <sup>H</sup> |                |
|                | <i>Plethobasus cyphus</i>     |     |     |      |                | X <sup>H</sup> |
|                | <i>Pleurobema cordatum</i>    |     |     |      | X <sup>W</sup> | X <sup>H</sup> |
|                | <i>Elliptio crassidens</i>    |     |     |      |                | X <sup>H</sup> |
|                | <i>E. dilatata</i>            |     |     |      | X <sup>W</sup> | X <sup>H</sup> |
| X              | <i>Obliquaria reflexa</i>     | 30  | 30  | 4.0  | X <sup>H</sup> |                |
| X              | <i>Proptera alata</i>         | 15  | 15  | 2.0  | X <sup>H</sup> |                |
| X              | <i>P. laevissima</i>          | 1   | 1   | 0.1  | X <sup>H</sup> |                |
|                | <i>P. capax</i>               |     |     |      |                |                |
|                | <i>P. purpurata</i>           |     |     |      |                |                |
| X              | <i>Leptodea fragilis</i>      | 5   | 22  | 27   | 3.6            | X <sup>H</sup> |
|                | <i>L. leptodon</i>            |     |     |      |                |                |
| X <sup>W</sup> | <i>Ellipsaria lineolata</i>   |     |     |      |                |                |
| X              | <i>Truncilla truncata</i>     | 9   | 9   | 1.2  | X <sup>H</sup> |                |
| X              | <i>T. donaciformis</i>        | 30  | 21  | 51   | 6.7            | X <sup>H</sup> |
| X              | <i>Obovaria olivaria</i>      | 22  | 22  | 2.9  | X <sup>H</sup> |                |
|                | <i>Actinonaias carinata</i>   |     |     |      | X <sup>W</sup> |                |
|                | <i>A. ellipsiformis</i>       |     |     |      |                |                |

|                                     | A   | J   | T   | %     | R              | H |
|-------------------------------------|-----|-----|-----|-------|----------------|---|
| X <sup>W</sup> <i>Ligumia recta</i> |     |     |     |       | X <sup>H</sup> |   |
| X <i>L. subrostrata</i>             |     |     |     |       |                |   |
| X <i>Carunculina parva</i>          | 8   | 154 | 162 | 21.4  | X <sup>H</sup> |   |
| X <i>Lampsilis teres</i>            | 5   |     | 5   | 0.7   |                |   |
| X <sup>H</sup> <i>L. higginsii</i>  |     |     |     |       |                |   |
| X <i>L. radiata siliquoidea</i>     | 4   |     | 4   | 0.5   | X <sup>H</sup> |   |
| X <i>L. ovata ventricosa</i>        | 13  | 3   | 16  | 2.1   | X <sup>H</sup> |   |
|                                     |     |     |     |       |                |   |
| X <i>Plagiola triquetra</i>         |     |     |     |       |                |   |
| X <i>Arcidens confragosus</i>       | 1   |     | 1   | 0.1   |                |   |
| <i>Lasmigona complanata</i>         |     |     |     |       |                |   |
| <i>L. costata</i>                   |     |     |     |       |                |   |
| <i>L. compressa</i>                 |     |     |     |       |                |   |
| <i>Alasmidonta marginata</i>        |     |     |     |       |                |   |
| <i>A. viridis</i>                   |     |     |     |       |                |   |
| <i>Simpsoniconcha ambigua</i>       |     |     |     |       |                |   |
| <i>Anodontoides ferussacianus</i>   |     |     |     |       |                |   |
| <i>Anodonta suborbiculata</i>       |     |     |     |       |                |   |
| X <i>A. imbecillis</i>              | 1   |     | 1   | 0.1   |                |   |
| X <i>A. grandis</i>                 | 21  |     | 21  | 2.8   |                |   |
| <i>Strophitus undulatus</i>         |     |     |     |       |                |   |
| <hr/>                               |     |     |     |       |                |   |
| 23                                  | 556 | 201 | 757 | 100.0 | 20             | 5 |

Notes:

## EXHIBIT 161

## 65. La Crosse Railroad Bridge

Site data: Exhibit(s) 58

Map(s): Exhibit(s) 204, 235

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 1  |   | 1  | 3.8  |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 4  |   | 4  | 15.4 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaias flava</i>     | 1  |   | 1  | 3.8  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 16 |   | 16 | 61.5 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1  |   | 1  | 3.8  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciformis</i>      | 1  | 2 | 3  | 11.5 |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

---

6

24

2

26

100.0

0

0

Notes:

## EXHIBIT 162

## 66. Hingen Island Bank Repair

Site data: Exhibit(s) 59

Map(s): Exhibit(s) 204, 236

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 14.3 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaia flava</i>        |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| X <i>Megalonaias gigantea</i> |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 1 |   | 1 | 14.3 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 14.3 |   |   |
| X <i>Obovaria olivaria</i>    | 4 |   | 4 | 57.1 |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Cannculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arctidens confragosus*  
*Lasmitona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

---

4 7 0 7 100.0 0 0

Notes:

## EXHIBIT 163

67. Sand Slough, 68. Sand Slough Bank Repair

Site data: Exhibit(s) 60

Map(s): Exhibit(s) 204, 236

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 1  |   | 1  | 3.6  |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 4  |   | 4  | 14.3 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaias flava</i>     | 6  |   | 6  | 21.4 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 10 |   | 10 | 35.7 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1  |   | 1  | 3.6  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| <i>T. donaciformis</i>        |    |   |    |      |   |   |
| X <i>Obovaria olivaria</i>    | 5  |   | 5  | 17.9 |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Camunculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |   |    |       |   |   |
| X <i>L. ovata ventricosa</i>      | 1  |   | 1  | 3.6   |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arctidens confragosus</i>      |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 7                                 | 28 | 0 | 28 | 100.0 | 0 | 0 |

Notes:



## EXHIBIT 164

69. Root River

Site data: Exhibit(s) 61

Map(s): Exhibit(s) 204, 237

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <hr/>                         |   |   |   |      |   |   |
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| <i>Q. pustulosa</i>           |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaias flava</i>       |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| <i>Amblema plicata</i>        |   |   |   |      |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1 |   | 1 | 33.3 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 33.3 |   |   |
| X <i>Obovaria olivaria</i>    | 1 |   | 1 | 33.3 |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Caminculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Anodonta confragosa*  
*Lasemigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imberillii*  
*A. grandis*  
*Strophitus undulatus*

5

5

0

3

100.0

0

0

Notes:

## EXHIBIT 165

## 70. Picayune Island

Site data: Exhibit(s) 62

Map(s): Exhibit(s) 204, 237

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 16.7 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaias flava</i>     | 1 |   | 1 | 16.7 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Ambelma plicata</i>      | 2 |   | 2 | 33.3 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| X <i>Obovaria olivaria</i>    | 2 |   | 2 | 33.3 |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Canoniculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

---

4 6 0 6 100.0 0 0

Notes:

## EXHIBIT 166

## 71. Above Brownsville

Site data: Exhibit(s) 63

Map(s): Exhibit(s) 204, 237

|                               | A  | J  | T  | %    | R | H |
|-------------------------------|----|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |    |    |      |   |   |
| X <i>Quadrula metanevra</i>   | 1  |    | 1  | 0.8  |   |   |
| X <i>Q. quadrula</i>          | 4  |    | 4  | 3.1  |   |   |
| X <i>Q. nodulata</i>          | 1  |    | 1  | 0.8  |   |   |
| X <i>Q. pustulosa</i>         | 11 |    | 11 | 8.5  |   |   |
| <i>Tritogonia verrucosa</i>   |    |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |    |    |      |   |   |
| X <i>Fusconaias flava</i>     | 5  |    | 5  | 3.9  |   |   |
| <i>F. ebena</i>               |    |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |    |    |      |   |   |
| X <i>Amblema plicata</i>      | 21 |    | 21 | 16.3 |   |   |
| <i>Plethobasus cyphus</i>     |    |    |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |    |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |    |    |      |   |   |
| <i>E. dilatata</i>            |    |    |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 7  |    | 7  | 5.4  |   |   |
| X <i>Proptera alata</i>       | 1  |    | 1  | 0.8  |   |   |
| <i>P. laevissima</i>          |    |    |    |      |   |   |
| <i>P. capax</i>               |    |    |    |      |   |   |
| <i>P. purpurata</i>           |    |    |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |    |    |      |   |   |
| <i>L. leptodon</i>            |    |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |    |    |      |   |   |
| <i>Truncilla truncata</i>     |    |    |    |      |   |   |
| X <i>T. donaciformis</i>      | 3  | 11 | 14 | 10.9 |   |   |
| X <i>Obovaria olivaria</i>    | 3  |    | 3  | 2.3  |   |   |
| <i>Actinonaias carinata</i>   |    |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |    |    |      |   |   |

|                                    | A  | J  | T   | %     | R | H |
|------------------------------------|----|----|-----|-------|---|---|
| <i>Ligumia recta</i>               |    |    |     |       |   |   |
| <i>L. subrostrata</i>              |    |    |     |       |   |   |
| X <i>Carunculina parva</i>         |    | 55 | 55  | 42.6  |   |   |
| <i>Lampsilis teres</i>             |    |    |     |       |   |   |
| <i>L. higginsii</i>                |    |    |     |       |   |   |
| <i>L. radiata siliquoidea</i>      |    |    |     |       |   |   |
| X <i>L. ovata ventricosa</i>       | 2  | 2  | 4   | 3.1   |   |   |
| <i>Plagiola triquetra</i>          |    |    |     |       |   |   |
| <i>Arcidens confragosus</i>        |    |    |     |       |   |   |
| <i>Lasmsgona complanata</i>        |    |    |     |       |   |   |
| <i>L. costata</i>                  |    |    |     |       |   |   |
| <i>L. compressa</i>                |    |    |     |       |   |   |
| <i>Alasmidonta marginata</i>       |    |    |     |       |   |   |
| <i>A. viridis</i>                  |    |    |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>      |    |    |     |       |   |   |
| <i>Anodontooides ferussacianus</i> |    |    |     |       |   |   |
| <i>Anodonta suborbiculata</i>      |    |    |     |       |   |   |
| <i>A. imbecillis</i>               |    |    |     |       |   |   |
| X <i>A. grandis</i>                | 2  |    | 2   | 1.6   |   |   |
| <i>Strophitus undulatus</i>        |    |    |     |       |   |   |
| 15                                 | 61 | 68 | 129 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 167

72. Brownsville

Site data: Exhibit(s) 64

Map(s): Exhibit(s) 204, 238

|                               | A | J  | T  | %    | R | H |
|-------------------------------|---|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |    |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |    |    |      |   |   |
| X <i>Q. quadrula</i>          | 3 |    | 3  | 1.9  |   |   |
| <i>Q. nodulata</i>            |   |    |    |      |   |   |
| X <i>Q. pustulosa</i>         | 4 |    | 4  | 2.5  |   |   |
| <i>Tritogonia verrucosa</i>   |   |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |    |    |      |   |   |
| X <i>Fusconaias flava</i>     | 2 | 1  | 3  | 1.9  |   |   |
| <i>F. ebena</i>               |   |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |    |    |      |   |   |
| X <i>Amblema plicata</i>      | 5 |    | 5  | 3.2  |   |   |
| <i>Plethobasus cyphus</i>     |   |    |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |    |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |    |    |      |   |   |
| <i>E. dilatata</i>            |   |    |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 3 |    | 3  | 1.9  |   |   |
| X <i>Proptera alata</i>       | 1 |    | 1  | 0.6  |   |   |
| <i>P. laevissima</i>          |   |    |    |      |   |   |
| <i>P. capax</i>               |   |    |    |      |   |   |
| <i>P. purpurata</i>           |   |    |    |      |   |   |
| X <i>Leptodea fragilis</i>    |   | 22 | 22 | 14.0 |   |   |
| <i>L. leptodon</i>            |   |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |    |    |      |   |   |
| X <i>Truncilla truncata</i>   | 3 |    | 3  | 1.9  |   |   |
| X <i>T. donaciiformis</i>     | 1 | 8  | 9  | 5.7  |   |   |
| X <i>Obovaria olivaria</i>    | 1 |    | 1  | 0.6  |   |   |
| <i>Actinonaias carinata</i>   |   |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |    |    |      |   |   |

[illegible]



## EXHIBIT 168

## 73. Crosby Slough

Site data: Exhibit(s) 65

Map(s): Exhibit(s) 204, 239

|   | A                             | J  | T  | %    | R | H |
|---|-------------------------------|----|----|------|---|---|
|   | <hr/>                         |    |    |      |   |   |
|   | <i>Cumberlandia monodonta</i> |    |    |      |   |   |
|   | <i>Quadrula metanevra</i>     |    |    |      |   |   |
| X | <i>Q. quadrula</i>            | 9  | 9  | 8.2  |   |   |
|   | <i>Q. nodulata</i>            |    |    |      |   |   |
| X | <i>Q. pustulosa</i>           | 25 | 25 | 22.7 |   |   |
|   | <i>Tritogonia verrucosa</i>   |    |    |      |   |   |
|   | <i>Cyclonaias tuberculata</i> |    |    |      |   |   |
| X | <i>Fusconaia flava</i>        | 18 | 18 | 16.4 |   |   |
|   | <i>F. ebena</i>               |    |    |      |   |   |
|   | <i>Megalonaias gigantea</i>   |    |    |      |   |   |
| X | <i>Amblema plicata</i>        | 38 | 38 | 34.5 |   |   |
|   | <i>Plethobasus cyphus</i>     |    |    |      |   |   |
|   | <i>Pleurobema cordatum</i>    |    |    |      |   |   |
|   | <i>Elliptio crassidens</i>    |    |    |      |   |   |
|   | <i>E. dilatata</i>            |    |    |      |   |   |
| X | <i>Obliquaria reflexa</i>     | 7  | 7  | 6.4  |   |   |
|   | <i>Proptera alata</i>         |    |    |      |   |   |
|   | <i>P. laevissima</i>          |    |    |      |   |   |
|   | <i>P. capax</i>               |    |    |      |   |   |
|   | <i>P. purpurata</i>           |    |    |      |   |   |
|   | <i>Leptodea fragilis</i>      |    |    |      |   |   |
|   | <i>L. leptodon</i>            |    |    |      |   |   |
|   | <i>Ellipsaria lineolata</i>   |    |    |      |   |   |
| X | <i>Truncilla truncata</i>     | 3  | 3  | 2.7  |   |   |
| X | <i>T. donaciformis</i>        | 7  | 7  | 6.1  |   |   |
| X | <i>Obovaria olivaria</i>      | 2  | 2  | 1.8  |   |   |
|   | <i>Actinonaias carinata</i>   |    |    |      |   |   |
|   | <i>A. ellipsiformis</i>       |    |    |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Caraculina parva*  
*Lampsilis teres*

*L. higginsi*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

|   |                              |   |  |   |     |  |
|---|------------------------------|---|--|---|-----|--|
| X | <i>Anodonta confragosa</i>   | 1 |  | 1 | 0.9 |  |
|   | <i>Lasmodonta complanata</i> |   |  |   |     |  |
|   | <i>L. costata</i>            |   |  |   |     |  |
|   | <i>L. compressa</i>          |   |  |   |     |  |

*Alasmodonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillilis*  
*A. grandis*  
*Strophitus undulatus*

|   |     |   |     |       |   |   |
|---|-----|---|-----|-------|---|---|
| 9 | 110 | 0 | 110 | 100.0 | 0 | 0 |
|---|-----|---|-----|-------|---|---|

Notes:

## EXHIBIT 169

## 74. Warners Landing

Site data: Exhibit(s) 66

Map(s): Exhibit(s) 204, 239

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 31 |   | 31 | 10.7 |   |   |
| X <i>Q. nodulata</i>          | 4  |   | 4  | 1.4  |   |   |
| X <i>Q. pustulosa</i>         | 32 |   | 32 | 11.0 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 31 |   | 31 | 10.7 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Ambelma plicata</i>      | 97 |   | 97 | 33.5 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 10 |   | 10 | 3.4  |   |   |
| X <i>Proptera alata</i>       | 13 |   | 13 | 4.5  |   |   |
| X <i>P. laevissima</i>        | 1  |   | 1  | 0.5  |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 5  |   | 5  | 1.7  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 3  |   | 3  | 1.0  |   |   |
| X <i>T. donaciiformis</i>     | 16 |   | 16 | 5.5  |   |   |
| X <i>Obovaria olivaria</i>    | 4  |   | 4  | 1.4  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A   | J | T   | %     | R | H |
|-----------------------------------|-----|---|-----|-------|---|---|
| <i>Ligumia recta</i>              |     |   |     |       |   |   |
| <i>L. subrostrata</i>             |     |   |     |       |   |   |
| X <i>Canoniculina parva</i>       | 8   |   | 8   | 2.7   |   |   |
| X <i>Lampsilis teres</i>          | 5   |   | 5   | 1.7   |   |   |
| <i>L. higginsii</i>               |     |   |     |       |   |   |
| X <i>L. radiata siliquoidea</i>   | 4   |   | 4   | 1.4   |   |   |
| X <i>L. ovata ventricosa</i>      | 9   |   | 9   | 3.1   |   |   |
| <i>Plagiola triquetra</i>         |     |   |     |       |   |   |
| <i>Arctidens confragosus</i>      |     |   |     |       |   |   |
| <i>Lasmigona complanata</i>       |     |   |     |       |   |   |
| <i>L. costata</i>                 |     |   |     |       |   |   |
| <i>L. compressa</i>               |     |   |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |   |     |       |   |   |
| <i>A. viridis</i>                 |     |   |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |     |   |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |     |   |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |   |     |       |   |   |
| X <i>A. imbecillis</i>            | 1   |   | 1   | 0.3   |   |   |
| X <i>A. grandis</i>               | 17  |   | 17  | 5.3   |   |   |
| <i>Strophitus undulatus</i>       |     |   |     |       |   |   |
| 18                                | 291 | 0 | 291 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 170

## Pool 9

Site data: Exhibit(s) 67-78

Map(s): Exhibit(s) 205

|                               | A   | J  | T   | %    | R              | H |
|-------------------------------|-----|----|-----|------|----------------|---|
| <i>Cumberlandia monodonta</i> |     |    |     |      |                |   |
| <i>Quadrula metanevra</i>     |     |    |     |      |                |   |
| X <i>Q. quadrula</i>          | 29  |    | 29  | 5.0  | X <sup>F</sup> |   |
| X <i>Q. nodulata</i>          | 10  |    | 10  | 1.7  | X <sup>P</sup> |   |
| X <i>Q. pustulosa</i>         | 54  |    | 54  | 9.2  | X <sup>F</sup> |   |
| <i>Tritogonia verrucosa</i>   |     |    |     |      | X <sup>F</sup> |   |
| <i>Cyclonaias tuberculata</i> |     |    |     |      |                |   |
| X <i>Fusconaias flava</i>     | 41  |    | 41  | 7.0  | X <sup>F</sup> |   |
| <i>F. ebena</i>               |     |    |     |      | X <sup>F</sup> |   |
| X <i>Megalonaias gigantea</i> | 5   |    | 5   | 0.9  | X <sup>F</sup> |   |
| X <i>Amblema plicata</i>      | 292 | 2  | 294 | 50.3 | X <sup>F</sup> |   |
| <i>Plethobasus cyphus</i>     |     |    |     |      |                |   |
| X <i>Pleurobema cordatum</i>  | 3   |    | 3   | 0.5  |                |   |
| <i>Elliptio crassidens</i>    |     |    |     |      |                |   |
| X <i>E. dilatata</i>          | 3   |    | 3   | 0.5  | X <sup>F</sup> |   |
| X <i>Obliquaria reflexa</i>   | 15  |    | 15  | 2.6  | X <sup>F</sup> |   |
| X <i>Proptera alata</i>       | 8   |    | 8   | 1.4  | X <sup>F</sup> |   |
| <i>P. laevissima</i>          |     |    |     |      |                |   |
| <i>P. capax</i>               |     |    |     |      |                |   |
| <i>P. purpurata</i>           |     |    |     |      |                |   |
| X <i>Leptodea fragilis</i>    | 3   |    | 3   | 0.5  | X <sup>P</sup> |   |
| <i>L. leptodon</i>            |     |    |     |      |                |   |
| <i>Ellipsaria lineolata</i>   |     |    |     |      | X <sup>F</sup> |   |
| X <i>Truncilla truncata</i>   | 16  |    | 16  | 2.7  | X <sup>F</sup> |   |
| X <i>T. donaciformis</i>      | 28  | 21 | 49  | 8.4  |                |   |
| X <i>Obovaria olivaria</i>    | 26  |    | 26  | 4.4  | X <sup>F</sup> |   |
| <i>Actinonaias carinata</i>   |     |    |     |      |                |   |
| <i>A. ellipsiformis</i>       |     |    |     |      |                |   |



## EXHIBIT 171

75. Island 126, 76. Head of Island 126 Bank Repair

Site data: Exhibit(s) 67

Map(s): Exhibit(s) 205, 240

|   | A  | J | T | %    | R | H |
|---|--|---|---|------|---|---|
| X | Cumberlandia monodonta<br>Quadrula metanevra<br><i>Q. quadrula</i><br><i>Q. nodulata</i>   | 1 | 1 | 14.3 |   |   |
| X | <i>Q. pustulosa</i><br>Tritogonia verrucosa<br>Cyclonaias tuberculata<br>Fusconaia flava<br><br>F. ebena<br>Megalonaias gigantea   | 1 | 1 | 14.3 |   |   |
| X | Amblema plicata<br>Plethobasus cyphus  | 3 | 3 | 42.9 |   |   |
|   | Pleurobema cordatum<br>Elliptio crassidens<br>E. dilatata<br>Obliquaria reflexa<br><br>Proptera alata<br>P. laevissima<br>P. capax<br>P. purpurata<br><br>Leptodea fragilis<br>L. leptodon |   |   |      |   |   |
| X | Ellipsaria lineolata<br>Truncilla truncata   | 1 | 1 | 14.3 |   |   |
| X | T. donaciformis<br>Obovaria olivaria<br>Actinonaias carinata<br>A. ellipsiformis   | 1 | 1 | 14.3 |   |   |

A J T % R H

*Ligumia recta*

*L. subrostrata*

*Camunculina parva*

*Lampsilis teres*

*L. higginsii*

*L. radiata siliquioidea*

*L. ovata ventricosa*

*Plagiola triquetra*

*Arcidens confragosus*

*Lasmigona complanata*

*L. costata*

*L. compressa*

*Alasmidonta marginata*

*A. viridis*

*Simpsoniconcha ambigua*

*Anodontoides ferussacianus*

*Anodonta suborbiculata*

*A. imbecillis*

*A. grandis*

*Strophitus undulatus*

---

5

7

0

7

100.0

0

0

Notes:



# EXHIBIT 172

77. Twin Island, 78. Head of Twin Island Bank Repair

Site data: Exhibit(s) 68

Map(s): Exhibit(s) 205, 240

|                               | A | J  | T  | %    | R | H |
|-------------------------------|---|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |    |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |    |    |      |   |   |
| <i>Q. quadrula</i>            |   |    |    |      |   |   |
| <i>Q. nodulata</i>            |   |    |    |      |   |   |
| X <i>Q. pustulosa</i>         | 2 |    | 2  | 14.3 |   |   |
| <i>Tritogonia verrucosa</i>   |   |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |    |    |      |   |   |
| <i>Fusconaias flava</i>       |   |    |    |      |   |   |
| <i>F. ebena</i>               |   |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |    |    |      |   |   |
| <i>Amblyma plicata</i>        |   |    |    |      |   |   |
| <i>Plethobasus cyphus</i>     |   |    |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |    |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |    |    |      |   |   |
| <i>E. dilatata</i>            |   |    |    |      |   |   |
| <i>Obliquaria reflexa</i>     |   |    |    |      |   |   |
| <i>Proptera alata</i>         |   |    |    |      |   |   |
| <i>P. laevissima</i>          |   |    |    |      |   |   |
| <i>P. capax</i>               |   |    |    |      |   |   |
| <i>P. purpurata</i>           |   |    |    |      |   |   |
| <i>Leptodea fragilis</i>      |   |    |    |      |   |   |
| <i>L. leptodon</i>            |   |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |    |    |      |   |   |
| <i>Truncilla truncata</i>     |   |    |    |      |   |   |
| X <i>T. donaciiformis</i>     |   | 10 | 10 | 71.4 |   |   |
| <i>Obovaria olivaria</i>      |   |    |    |      |   |   |
| <i>Actinonaias carinata</i>   |   |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |    |    |      |   |   |

|                                   | A | J  | T  | %     | R | H |
|-----------------------------------|---|----|----|-------|---|---|
| X                                 |   |    |    |       |   |   |
| <i>Ligumia recta</i>              |   |    |    |       |   |   |
| <i>L. subrostrata</i>             |   |    |    |       |   |   |
| <i>Carunculina parva</i>          |   | 2  | 2  | 14.3  |   |   |
| <i>Lampsilis teres</i>            |   |    |    |       |   |   |
| <i>L. higginsii</i>               |   |    |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |   |    |    |       |   |   |
| <i>L. ovata ventricosa</i>        |   |    |    |       |   |   |
| <i>Plagiola triquetra</i>         |   |    |    |       |   |   |
| <i>Arceidens confragosus</i>      |   |    |    |       |   |   |
| <i>Lasmigona complanata</i>       |   |    |    |       |   |   |
| <i>L. costata</i>                 |   |    |    |       |   |   |
| <i>L. compressa</i>               |   |    |    |       |   |   |
| <i>Alasmidonta marginata</i>      |   |    |    |       |   |   |
| <i>A. viridis</i>                 |   |    |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |    |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |   |    |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |   |    |    |       |   |   |
| <i>A. imbecillis</i>              |   |    |    |       |   |   |
| <i>A. grandis</i>                 |   |    |    |       |   |   |
| <i>Strophitus undulatus</i>       |   |    |    |       |   |   |
| 5                                 | 2 | 12 | 14 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 173

## 79. Below Twin Island

Site data: Exhibit(s) 69

Map(s): Exhibit(s) 205, 240

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| <i>Q. quadrula</i>            |   |   |   |      |   |   |
| <i>Q. nodulata</i>            |   |   |   |      |   |   |
| X <i>Q. pustulosa</i>         | 1 |   | 1 | 20.0 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 2 |   | 2 | 40.0 |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| <i>Amblema plicata</i>        |   |   |   |      |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| X <i>Obliquaria reflexa</i>   | 1 |   | 1 | 20.0 |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      |   | 1 | 1 | 20.0 |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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4

4

1

5

100.0

0

0

Notes:

## EXHIBIT 174

## 80. Battle Island

Site data: Exhibit(s) 70

Map(s): Exhibit(s) 205, 241

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| X <i>Quadrula metanevra</i>   |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 1  |   | 1  | 2.6  |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 7  |   | 7  | 18.4 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| <i>Fusconaia flava</i>        |    |   |    |      |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| X <i>Megalonaias gigantea</i> |    |   |    |      |   |   |
| X <i>Ambelma plicata</i>      | 10 |   | 10 | 26.3 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| X <i>Elliptio crassidens</i>  |    |   |    |      |   |   |
| X <i>E. dilatata</i>          | 1  |   | 1  | 2.6  |   |   |
| X <i>Obliquaria reflexa</i>   | 4  |   | 4  | 10.5 |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 1  |   | 1  | 2.6  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 2  |   | 2  | 5.3  |   |   |
| X <i>T. donaciiformis</i>     | 4  |   | 4  | 10.5 |   |   |
| X <i>Obovaria olivaria</i>    | 7  |   | 7  | 18.4 |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Carunculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |   |    |       |   |   |
| X <i>L. ovata ventricosa</i>      | 1  |   | 1  | 2.6   |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 10                                | 38 | 0 | 38 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 175

81. PeSoto

Site data: Exhibit(s) 71

Map(s): Exhibit(s) 205, 242

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 2  |   | 2  | 1.6  |   |   |
| <i>Q. nodulata</i>            |    |   |    |      |   |   |
| X <i>Q. pustulosa</i>         | 12 |   | 12 | 9.7  |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 10 |   | 10 | 8.1  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 88 |   | 88 | 71.0 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| X <i>Pleurobema cordatum</i>  | 3  |   | 3  | 2.4  |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| X <i>E. dilatata</i>          | 2  |   | 2  | 1.6  |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 1.6  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 2  |   | 2  | 1.6  |   |   |
| X <i>T. donaciformis</i>      | 1  |   | 1  | 0.8  |   |   |
| X <i>Obovaria olivaria</i>    | 1  |   | 1  | 0.8  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

|   |                             |   |  |   |     |  |
|---|-----------------------------|---|--|---|-----|--|
| X | <i>Arcidens confragosus</i> | 1 |  | 1 | 0.8 |  |
|   | <i>Lasmigona complanata</i> |   |  |   |     |  |
|   | <i>L. costata</i>           |   |  |   |     |  |
|   | <i>L. compressa</i>         |   |  |   |     |  |

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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|    |     |   |     |       |   |   |
|----|-----|---|-----|-------|---|---|
| 11 | 124 | 0 | 124 | 100.0 | 0 | 0 |
|----|-----|---|-----|-------|---|---|

Notes:



## EXHIBIT 176

82. Above Indian Camp Light,  
83. Mouth of Hummingbird Slough Bank Repair

Site data: Exhibit(s) 72

Map(s): Exhibit(s) 205, 243

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 2  |   | 2  | 1.8  |   |   |
| X <i>Q. nodulata</i>          | 2  |   | 2  | 1.8  |   |   |
| X <i>Q. pustulosa</i>         | 8  |   | 8  | 7.1  |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 9  |   | 9  | 8.0  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 64 | 2 | 66 | 58.4 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 1.8  |   |   |
| X <i>Proptera alata</i>       | 2  |   | 2  | 1.8  |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| <i>Truncilla truncata</i>     |    |   |    |      |   |   |
| X <i>T. donaciformis</i>      | 4  | 8 | 12 | 10.6 |   |   |
| X <i>Obovaria olivaria</i>    | 8  |   | 8  | 7.1  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A   | J  | T   | %     | R | H |
|-----------------------------------|-----|----|-----|-------|---|---|
| <i>Ligumina recta</i>             |     |    |     |       |   |   |
| <i>L. subrostrata</i>             |     |    |     |       |   |   |
| <i>Caniculina parva</i>           |     |    |     |       |   |   |
| <i>Lampsilis teres</i>            |     |    |     |       |   |   |
| <i>L. higginsii</i>               |     |    |     |       |   |   |
| <i>L. radiata siliquoides</i>     |     |    |     |       |   |   |
| <i>L. ovata ventricosa</i>        |     |    |     |       |   |   |
| <i>Plagiola triquetra</i>         |     |    |     |       |   |   |
| <i>Arcidens confragosus</i>       |     |    |     |       |   |   |
| X <i>Lasmigona complanata</i>     | 2   |    | 2   | 1.8   |   |   |
| <i>L. costata</i>                 |     |    |     |       |   |   |
| <i>L. compressa</i>               |     |    |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |    |     |       |   |   |
| <i>A. viridis</i>                 |     |    |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |     |    |     |       |   |   |
| <i>Anodontoidea ferussacianus</i> |     |    |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |    |     |       |   |   |
| <i>A. imbecillis</i>              |     |    |     |       |   |   |
| <i>A. grandis</i>                 |     |    |     |       |   |   |
| <i>Strophitus undulatus</i>       |     |    |     |       |   |   |
| 10                                | 103 | 10 | 113 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 177

## 84. Indian Camp Light

Site data: Exhibit(s) 73

Map(s): Exhibit(s) 205, 243

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| <i>Q. quadrula</i>            |    |   |    |      |   |   |
| X <i>Q. nodulata</i>          | 1  |   | 1  | 3.4  |   |   |
| X <i>Q. pustulosa</i>         | 1  |   | 1  | 3.4  |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 5  |   | 5  | 17.2 |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 11 |   | 11 | 37.9 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 6.9  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 1  |   | 1  | 3.4  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 2  |   | 2  | 6.9  |   |   |
| X <i>T. donaciformis</i>      | 3  | 1 | 4  | 13.8 |   |   |
| X <i>Obovaria olivaria</i>    | 1  |   | 1  | 3.4  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| X <i>Canoniculina parva</i>       |    | 1 | 1  | 3.4   |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoidea</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 10                                | 27 | 2 | 29 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 178

## 85. Lansing Upper Light

Site data: Exhibit(s) 74

Map(s): Exhibit(s) 205, 243

|                               | A  | J | T  | %    | R              | H |
|-------------------------------|----|---|----|------|----------------|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |                |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |                |   |
| X <i>Q. quadrula</i>          | 2  |   | 2  | 2.0  | X <sup>P</sup> |   |
| X <i>Q. nodulata</i>          | 1  |   | 1  | 1.0  | X <sup>P</sup> |   |
| X <i>Q. pustulosa</i>         | 5  |   | 5  | 5.0  | X <sup>P</sup> |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |                |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |                |   |
| X <i>Fusconaia flava</i>      | 7  |   | 7  | 6.9  | X <sup>P</sup> |   |
| <i>F. ebena</i>               |    |   |    |      |                |   |
| X <i>Megalonaias gigantea</i> | 3  |   | 3  | 3.0  | X <sup>P</sup> |   |
| X <i>Amblema plicata</i>      | 48 |   | 48 | 47.5 | X <sup>P</sup> |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |                |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |                |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |                |   |
| <i>E. dilatata</i>            |    |   |    |      |                |   |
| <i>Obliquaria reflexa</i>     |    |   |    |      | X <sup>P</sup> |   |
| X <i>Proptera alata</i>       | 5  |   | 5  | 5.0  | X <sup>P</sup> |   |
| <i>P. laevissima</i>          |    |   |    |      |                |   |
| <i>P. capax</i>               |    |   |    |      |                |   |
| <i>P. purpurata</i>           |    |   |    |      |                |   |
| X <i>Leptodea fragilis</i>    | 1  |   | 1  | 1.0  | X <sup>P</sup> |   |
| <i>L. leptodon</i>            |    |   |    |      |                |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |                |   |
| X <i>Truncilla truncata</i>   | 3  |   | 3  | 3.0  |                |   |
| X <i>T. donaciformis</i>      |    | 1 | 1  | 1.0  |                |   |
| X <i>Obovaria olivaria</i>    | 8  |   | 8  | 7.9  | X <sup>P</sup> |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |                |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |                |   |

[illegible]

# EXHIBIT 179

## 86. Lansing Small Boat Harbor

Site data: Exhibit(s) 75

Map(s): Exhibit(s) 205, 243

|                               | A | J | T | %     | R | H |
|-------------------------------|---|---|---|-------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |       |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |       |   |   |
| <i>Q. quadrula</i>            |   |   |   |       |   |   |
| <i>Q. nodulata</i>            |   |   |   |       |   |   |
| <i>Q. pustulosa</i>           |   |   |   |       |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |       |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |       |   |   |
| <i>Fusconaia flava</i>        |   |   |   |       |   |   |
| <i>F. ebena</i>               |   |   |   |       |   |   |
| <i>Megalonaia gigantea</i>    |   |   |   |       |   |   |
| <i>Amblema plicata</i>        |   |   |   |       |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |       |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |       |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |       |   |   |
| <i>E. dilatata</i>            |   |   |   |       |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |       |   |   |
| <i>Proptera alata</i>         |   |   |   |       |   |   |
| <i>P. laevissima</i>          |   |   |   |       |   |   |
| <i>P. capax</i>               |   |   |   |       |   |   |
| <i>P. purpurata</i>           |   |   |   |       |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |       |   |   |
| <i>L. leptodon</i>            |   |   |   |       |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |       |   |   |
| <i>Truncilla truncata</i>     |   |   |   |       |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 100.0 |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |       |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |       |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |       |   |   |

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoides*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

1

1

0

1

100.0

0

0

Notes:



EXHIBIT 180

87. Atchafalaya

Site data: Exhibit(s) 76

Map(s): Exhibit(s) 205, 244

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 8  |   | 8  | 10.3 |   |   |
| X <i>Q. nodulata</i>          | 2  |   | 2  | 2.6  |   |   |
| X <i>Q. pustulosa</i>         | 8  |   | 8  | 10.3 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 6  |   | 6  | 7.7  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| X <i>Megalonaias gigantea</i> | 1  |   | 1  | 1.3  |   |   |
| X <i>Amblema plicata</i>      | 39 |   | 39 | 50.0 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 2.6  |   |   |
| <i>Proptera alata</i>         |    |   |    |      |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 3  |   | 3  | 3.8  |   |   |
| X <i>T. donaciformis</i>      | 6  |   | 6  | 7.7  |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Carunculina parva</i>          |    |   |    |       |   |   |
| X <i>Lampsilis teres</i>          | 1  |   | 1  | 1.3   |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoides</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| X <i>Arcidens confragosus</i>     | 1  |   | 1  | 1.3   |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| X <i>A. grandis</i>               | 1  |   | 1  | 1.3   |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 12                                | 78 | 0 | 78 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 181

## 88. Crooked Slough

Site data: Exhibit(s) 77

Map(s): Exhibit(s) 205, 245

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 9  |   | 9  | 14.3 |   |   |
| X <i>Q. nodulata</i>          | 3  |   | 3  | 4.8  |   |   |
| X <i>Q. pustulosa</i>         | 9  |   | 9  | 14.3 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 2  |   | 2  | 3.2  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 24 |   | 24 | 38.1 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 2  |   | 2  | 3.2  |   |   |
| X <i>Proptera alata</i>       | 1  |   | 1  | 1.6  |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 3  |   | 3  | 4.8  |   |   |
| X <i>T. lonaciformis</i>      | 9  |   | 9  | 14.3 |   |   |
| <i>Obovaria olivaria</i>      |    |   |    |      |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Carunculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoides</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| X <i>A. grandis</i>               | 1  |   | 1  | 1.6   |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 10                                | 63 | 0 | 63 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 182

## 89. Locks and Dam 9 Upper Approach

Site data: Exhibit(s) 78

Map(s): Exhibit(s) 205,246

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| X <i>Q. quadrula</i>          | 4 |   | 4 | 33.3 |   |   |
| X <i>Q. nodulata</i>          | 1 |   | 1 | 8.3  |   |   |
| <i>Q. pustulosa</i>           |   |   |   |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| <i>Fusconaia flava</i>        |   |   |   |      |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| X <i>Megalonaias gigantea</i> | 1 |   | 1 | 8.3  |   |   |
| X <i>Ambelma plicata</i>      | 5 |   | 5 | 41.7 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| <i>T. donaciformis</i>        |   |   |   |      |   |   |
| <i>Obovaria olivaria</i>      |   |   |   |      |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

|                                   | A | J | T | %   | R | H |
|-----------------------------------|---|---|---|-----|---|---|
| <i>Ligumia recta</i>              |   |   |   |     |   |   |
| <i>L. subrostrata</i>             |   |   |   |     |   |   |
| <i>Camnuculina parva</i>          |   |   |   |     |   |   |
| <i>Lampsilis teres</i>            |   |   |   |     |   |   |
| <i>L. higginsii</i>               |   |   |   |     |   |   |
| <i>L. radiata siliquidea</i>      |   |   |   |     |   |   |
| <i>L. ovata ventricosa</i>        |   |   |   |     |   |   |
| <i>Plagiola triquetra</i>         |   |   |   |     |   |   |
| X <i>Arcidens confragosus</i>     | 1 |   | 1 | 8.5 |   |   |
| <i>Lasmigona complanata</i>       |   |   |   |     |   |   |
| <i>L. costata</i>                 |   |   |   |     |   |   |
| <i>L. compressa</i>               |   |   |   |     |   |   |
| <i>Alismidonta marginata</i>      |   |   |   |     |   |   |
| <i>A. viridis</i>                 |   |   |   |     |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |   |   |     |   |   |
| <i>Anodontoides ferussacianus</i> |   |   |   |     |   |   |
| <i>Anodonta suborbiculata</i>     |   |   |   |     |   |   |
| <i>A. imbecillis</i>              |   |   |   |     |   |   |
| <i>A. grandis</i>                 |   |   |   |     |   |   |
| <i>Strophitus undulatus</i>       |   |   |   |     |   |   |

5

12 0 12 100.0 0 0

Notes:

## EXHIBIT 183

## Pool 10

Site data: Exhibit(s) 79-89

Map(s): Exhibit(s) 206

|                               | A    | J  | T    | %    | R              | H               |
|-------------------------------|------|----|------|------|----------------|-----------------|
| <i>Cumberlandia monodonta</i> |      |    |      |      |                | X <sup>BB</sup> |
| X <i>Quadrula metanevra</i>   | 8    |    | 8    | 0.3  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Q. quadrula</i>          | 68   |    | 68   | 2.6  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Q. nodulata</i>          | 60   |    | 60   | 2.3  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Q. pustulosa</i>         | 159  |    | 159  | 6.2  | X <sup>H</sup> | X <sup>E</sup>  |
| <i>Tritogonia verrucosa</i>   |      |    |      |      | X <sup>H</sup> | X <sup>E</sup>  |
| <i>Cyclonaias tuberculata</i> |      |    |      |      |                | X <sup>E</sup>  |
| X <i>Fusconaias flava</i>     | 84   |    | 84   | 3.3  | X <sup>H</sup> | X <sup>E</sup>  |
| <i>F. ebena</i>               |      |    |      |      | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Megalonaias gigantea</i> | 61   |    | 61   | 2.4  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Amblema plicata</i>      | 1711 | 4  | 1715 | 66.6 | X <sup>H</sup> | X <sup>E</sup>  |
| <i>Plethobasus cyphus</i>     |      |    |      |      |                | X <sup>E</sup>  |
| <i>Pleurobema cordatum</i>    |      |    |      |      | X <sup>H</sup> | X <sup>V</sup>  |
| <i>Elliptio crassidens</i>    |      |    |      |      |                | X <sup>H</sup>  |
| X <i>E. dilatata</i>          | 63   |    | 63   | 2.4  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Obliquaria reflexa</i>   | 49   |    | 49   | 1.9  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Proptera alata</i>       | 22   |    | 22   | 0.9  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>P. laevissima</i>        | 2    | 1  | 3    | 0.1  | X <sup>H</sup> | X <sup>V</sup>  |
| <i>P. capax</i>               |      |    |      |      |                | X <sup>E</sup>  |
| <i>P. purpurata</i>           |      |    |      |      |                |                 |
| X <i>Leptodea fragilis</i>    | 13   | 1  | 14   | 0.5  | X <sup>H</sup> | X <sup>E</sup>  |
| <i>L. leptodon</i>            |      |    |      |      |                | X <sup>V</sup>  |
| <i>Ellipsaria lineolata</i>   |      |    |      |      | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Truncilla truncata</i>   | 20   |    | 20   | 0.8  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>T. donaciformis</i>      | 27   | 22 | 49   | 1.9  | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Obovaria olivaria</i>    | 62   |    | 62   | 2.4  | X <sup>H</sup> | X <sup>E</sup>  |
| <i>Actinonaias carinata</i>   |      |    |      |      | X <sup>H</sup> | X <sup>E</sup>  |
| <i>A. ellipsiformis</i>       |      |    |      |      |                |                 |

|  | A    | J   | T    | %     | R              | H               |
|--|------|-----|------|-------|----------------|-----------------|
| X <i>Ligumia recta</i>                       | 7    |     | 7    | 0.3   | X <sup>H</sup> | X <sup>E</sup>  |
| <i>L. subrostrata</i>                        |      |     |      |       |                |                 |
| X <i>Carunculina parva</i>                   | 4    | 79  | 83   | 3.2   | X <sup>H</sup> | X <sup>V</sup>  |
| X <i>Lampsilis teres</i>                     | 1    |     | 1    | <0.1  | X <sup>H</sup> | X <sup>E</sup>  |
| X <sup>1</sup> <i>L. higginsii</i>           |      |     |      |       | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>L. radiata siliquoidea</i>              | 8    |     | 8    | 0.3   | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>L. ovata ventricosa</i>                 | 8    |     | 8    | 0.3   | X <sup>H</sup> | X <sup>E</sup>  |
| <i>Plagiola triquetra</i>                    |      |     |      |       |                |                 |
| X <i>Arcidens confragosus</i>                | 15   |     | 15   | 0.6   | X <sup>H</sup> | X <sup>E</sup>  |
| <i>Lasmigona complanata</i>                  |      |     |      |       | X <sup>H</sup> | X <sup>V</sup>  |
| <i>L. costata</i>                            |      |     |      |       | X <sup>H</sup> | X <sup>V</sup>  |
| <i>L. compressa</i>                          |      |     |      |       |                |                 |
| <i>Alasmidonta marginata</i>                 |      |     |      |       |                | X <sup>V</sup>  |
| <i>A. viridis</i>                            |      |     |      |       |                |                 |
| <i>Simpsoniconcha ambigua</i>                |      |     |      |       |                | X <sup>E</sup>  |
| <i>Anodontoides ferussacianus</i>            |      |     |      |       |                |                 |
| X <sup>W</sup> <i>Anodonta suborbiculata</i> |      |     |      |       |                |                 |
| X <i>A. imbecillis</i>                       | 4    |     | 4    | 0.2   | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>A. grandis</i>                          | 11   |     | 11   | 0.4   | X <sup>H</sup> | X <sup>E</sup>  |
| X <i>Strophitus undulatus</i>                | 3    |     | 3    | 0.1   | X <sup>H</sup> | X <sup>E</sup>  |
| 26   | 2470 | 107 | 2577 | 100.0 | 32             | 42 <sup>2</sup> |

Notes:

<sup>1</sup> See note 1, Exhibit 98.

<sup>2</sup> This total includes the records of *Quadrula fragosa*, *Pleurobema rubrum* (i.e., "*P. cordatum*" and *P. sintoxia* from this site by Havlik and Stansbery (1978).



## EXHIBIT 184

## 90. Locks and Dam 9 Lower Approach

Site data: Exhibit(s) 79

Map(s): Exhibit(s) 206,246

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 1  |   | 1  | 1.0  |   |   |
| X <i>Q. nodulata</i>          | 2  |   | 2  | 2.0  |   |   |
| X <i>Q. pustulosa</i>         | 17 |   | 17 | 17.0 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 4  |   | 4  | 4.0  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Ambelma plicata</i>      | 56 |   | 56 | 56.0 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 14 |   | 14 | 14.0 |   |   |
| X <i>Proptera alata</i>       | 1  |   | 1  | 1.0  |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 2  |   | 2  | 2.0  |   |   |
| X <i>T. donaciformis</i>      | 1  |   | 1  | 1.0  |   |   |
| X <i>Obovaria olivaria</i>    | 1  |   | 1  | 1.0  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A   | J | T   | %     | R | H |
|-----------------------------------|-----|---|-----|-------|---|---|
| <i>Ligumia recta</i>              |     |   |     |       |   |   |
| <i>L. subrostrata</i>             |     |   |     |       |   |   |
| <i>Camnuculina parva</i>          |     |   |     |       |   |   |
| <i>Lampsilis teres</i>            |     |   |     |       |   |   |
| <i>L. higginsii</i>               |     |   |     |       |   |   |
| <i>L. radiata siliquoidea</i>     |     |   |     |       |   |   |
| <i>L. ovata ventricosa</i>        |     |   |     |       |   |   |
| <i>Plagiola triquetra</i>         |     |   |     |       |   |   |
| <i>Arcidens confragosus</i>       |     |   |     |       |   |   |
| <i>Lasmigona complanata</i>       |     |   |     |       |   |   |
| <i>L. costata</i>                 |     |   |     |       |   |   |
| <i>L. compressa</i>               |     |   |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |   |     |       |   |   |
| <i>A. viridis</i>                 |     |   |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |     |   |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |     |   |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |   |     |       |   |   |
| X <i>A. imbecillis</i>            | 1   |   | 1   | 1.0   |   |   |
| <i>A. grandis</i>                 |     |   |     |       |   |   |
| <i>Strophitus undulatus</i>       |     |   |     |       |   |   |
| 11                                | 100 | 0 | 100 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 185

## 91. Hay Point Bank Repair

Site data: Exhibit(s) 80

Map(s): Exhibit(s) 206, 246

|                               | A   | J | T   | %    | R | H |
|-------------------------------|-----|---|-----|------|---|---|
| <i>Cumberlandia monodonta</i> |     |   |     |      |   |   |
| <i>Quadrula metanevra</i>     |     |   |     |      |   |   |
| X <i>Q. quadrula</i>          | 5   |   | 5   | 0.8  |   |   |
| X <i>Q. nodulata</i>          | 2   |   | 2   | 0.3  |   |   |
| X <i>Q. pustulosa</i>         | 47  |   | 47  | 7.7  |   |   |
| <i>Tritogonia verrucosa</i>   |     |   |     |      |   |   |
| <i>Cyclonaias tuberculata</i> |     |   |     |      |   |   |
| X <i>Fusconaias flava</i>     | 19  |   | 19  | 3.1  |   |   |
| <i>F. ebena</i>               |     |   |     |      |   |   |
| X <i>Megalonaias gigantea</i> | 6   |   | 6   | 1.0  |   |   |
| X <i>Amblema plicata</i>      | 428 |   | 428 | 70.2 |   |   |
| <i>Plethobasus cyphus</i>     |     |   |     |      |   |   |
| <i>Pleurobema cordatum</i>    |     |   |     |      |   |   |
| <i>Elliptio crassidens</i>    |     |   |     |      |   |   |
| X <i>E. dilatata</i>          | 37  |   | 37  | 6.1  |   |   |
| X <i>Obliquaria reflexa</i>   | 8   |   | 8   | 1.3  |   |   |
| X <i>Proptera alata</i>       | 8   |   | 8   | 1.3  |   |   |
| X <i>P. laevissima</i>        |     | 1 | 1   | 0.2  |   |   |
| <i>P. capax</i>               |     |   |     |      |   |   |
| <i>P. purpurata</i>           |     |   |     |      |   |   |
| <i>Leptodea fragilis</i>      |     |   |     |      |   |   |
| <i>L. leptodon</i>            |     |   |     |      |   |   |
| <i>Ellipsaria lineolata</i>   |     |   |     |      |   |   |
| X <i>Truncilla truncata</i>   | 6   |   | 6   | 1.0  |   |   |
| X <i>T. donaciformis</i>      | 4   | 3 | 7   | 1.1  |   |   |
| X <i>Obovaria olivaria</i>    | 7   |   | 7   | 1.1  |   |   |
| <i>Actinonaias carinata</i>   |     |   |     |      |   |   |
| <i>A. ellipsiformis</i>       |     |   |     |      |   |   |

|                                   | A   | J  | T   | %     | R | H |
|-----------------------------------|-----|----|-----|-------|---|---|
| X <i>Ligumia recta</i>            | 3   |    | 3   | 0.5   |   |   |
| <i>L. subrostrata</i>             |     |    |     |       |   |   |
| X <i>Carunculina parva</i>        |     | 14 | 14  | 2.3   |   |   |
| <i>Lampsilis teres</i>            |     |    |     |       |   |   |
| <i>L. higginsi</i>                |     |    |     |       |   |   |
| X <i>L. radiata siliquoidea</i>   | 1   |    | 1   | 0.2   |   |   |
| X <i>L. ovata ventricosa</i>      | 2   |    | 2   | 0.3   |   |   |
| <i>Flagiola triquetra</i>         |     |    |     |       |   |   |
| X <i>Arcidens confragosus</i>     | 2   |    | 2   | 0.3   |   |   |
| <i>Lasmigona complanata</i>       |     |    |     |       |   |   |
| <i>L. costata</i>                 |     |    |     |       |   |   |
| <i>L. compressa</i>               |     |    |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |    |     |       |   |   |
| <i>A. viridis</i>                 |     |    |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |     |    |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |     |    |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |    |     |       |   |   |
| <i>A. imbecillis</i>              |     |    |     |       |   |   |
| X <i>A. grandis</i>               | 6   |    | 6   | 1.0   |   |   |
| X <i>Strophitus undulatus</i>     | 1   |    | 1   | 0.2   |   |   |
| <hr/>                             |     |    |     |       |   |   |
| 20                                | 592 | 18 | 610 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 186

## 92. Jackson Island

Site data: Exhibit(s) 81

Map(s): Exhibit(s) 206,247

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 2  |   | 2  | 1.7  |   |   |
| X <i>Q. nodulata</i>          | 2  |   | 2  | 1.7  |   |   |
| X <i>Q. pustulosa</i>         | 7  |   | 7  | 6.0  |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 6  |   | 6  | 5.2  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 90 |   | 90 | 77.6 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| <i>Obliquaria reflexa</i>     |    |   |    |      |   |   |
| X <i>Proptera alata</i>       | 1  |   | 1  | 0.9  |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1  |   | 1  | 0.9  |   |   |
| X <i>T. donaciformis</i>      | 2  |   | 2  | 1.7  |   |   |
| X <i>Obovaria olivaria</i>    | 2  |   | 2  | 1.7  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A   | J | T   | %     | R | H |
|-----------------------------------|-----|---|-----|-------|---|---|
| <i>Ligumia recta</i>              |     |   |     |       |   |   |
| <i>L. subrostrata</i>             |     |   |     |       |   |   |
| <i>Carunculina parva</i>          |     |   |     |       |   |   |
| <i>Lampsilis teres</i>            |     |   |     |       |   |   |
| <i>L. higginsii</i>               |     |   |     |       |   |   |
| <i>L. radiata siliquoides</i>     |     |   |     |       |   |   |
| X <i>L. ovata ventricosa</i>      | 1   |   | 1   | 0.9   |   |   |
| <i>Plagiola triquetra</i>         |     |   |     |       |   |   |
| X <i>Arcidens confragosus</i>     | 1   |   | 1   | 0.9   |   |   |
| <i>Lasmigona complanata</i>       |     |   |     |       |   |   |
| <i>L. costata</i>                 |     |   |     |       |   |   |
| <i>L. compressa</i>               |     |   |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |   |     |       |   |   |
| <i>A. viridis</i>                 |     |   |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |     |   |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |     |   |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |   |     |       |   |   |
| X <i>A. imbecillis</i>            | 1   |   | 1   | 0.9   |   |   |
| <i>A. grandis</i>                 |     |   |     |       |   |   |
| <i>Strophitus undulatus</i>       |     |   |     |       |   |   |
| 12                                | 116 | 0 | 116 | 100.0 | 0 | 0 |

Notes:

EXHIBIT 187

93. Mississippi Gardens<sup>1</sup>

Site data: Exhibit(s) 82

Map(s): Exhibit(s) 206, 247

A J T % R H

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*Cumberlandia monodonta*  
*Quadrula metanevra*  
*Q. quadrula*  
*Q. nodulata*

*Q. pustulosa*  
*Tritogonia verrucosa*  
*Cyclonaias tuberculata*  
*Fusconaia flava*

*F. ebena*  
*Megalonaias gigantea*  
*Ambelma plicata*  
*Flethobasus cyphus*

*Pleurobema cordatum*  
*Elliptio crassidens*  
*E. dilatata*  
*Obliquaria reflexa*

*Proptera alata*  
*P. laevissima*  
*P. capax*  
*P. purpurata*

*Leptodea fragilis*  
*L. leptodon*  
*Ellipsaria lineolata*  
*Truncilla truncata*

*T. donaciformis*  
*Obovaria olivaria*  
*Actinonaias carinata*  
*A. ellipsiformis*

A J T % R H

*Ligumia recta*  
*L. subrostrata*  
*Carunculina parva*  
*Lampsilis teres*

*L. higginsii*  
*L. radiata siliquoidea*  
*L. ovata ventricosa*  
*Plagiola triquetra*

*Arcidens confragosus*  
*Lasmigona complanata*  
*L. costata*  
*L. compressa*

*Alasmidonta marginata*  
*A. viridis*  
*Simpsoniconcha ambigua*  
*Anodontoides ferussacianus*

*Anodonta suborbiculata*  
*A. imbecillis*  
*A. grandis*  
*Strophitus undulatus*

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Notes:

<sup>1</sup> See discussion of this Site in Results: Sites.



## EXHIBIT 188

## 94. Prairie du Chien East Channel

Site data: Exhibit(s) 83

Map(s): Exhibit(s) 206, 248

|                               | A   | J | T   | %    | R              | H              |
|-------------------------------|-----|---|-----|------|----------------|----------------|
| <i>Cumberlandia monodonta</i> |     |   |     |      |                | X <sup>V</sup> |
| X <i>Quadrula metanevra</i>   | 8   |   | 8   | 0.7  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Q. quadrula</i>          | 29  |   | 29  | 2.6  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Q. nodulata</i>          | 2   |   | 2   | 0.2  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Q. pustulosa</i>         | 41  |   | 41  | 3.6  | X <sup>V</sup> | X <sup>V</sup> |
| <i>Tritogonia verrucosa</i>   |     |   |     |      | X <sup>V</sup> | X <sup>V</sup> |
| <i>Cyclonaias tuberculata</i> |     |   |     |      |                | X <sup>V</sup> |
| X <i>Fusconaia flava</i>      | 34  |   | 34  | 3.0  | X <sup>V</sup> | X <sup>V</sup> |
| <i>F. ebena</i>               |     |   |     |      | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Megalonaias gigantea</i> | 53  |   | 53  | 4.7  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Amblema plicata</i>      | 861 |   | 861 | 76.6 | X <sup>V</sup> | X <sup>V</sup> |
| <i>Plethobasus cyphus</i>     |     |   |     |      |                | X <sup>V</sup> |
| <i>Pleurobema cordatum</i>    |     |   |     |      | X <sup>V</sup> | X <sup>V</sup> |
| <i>Elliptio crassidens</i>    |     |   |     |      |                | X <sup>V</sup> |
| X <i>E. dilatata</i>          | 24  |   | 24  | 2.1  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Obliquaria reflexa</i>   | 4   |   | 4   | 0.4  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Proptera alata</i>       | 9   |   | 9   | 0.8  | X <sup>V</sup> | X <sup>V</sup> |
| <i>P. laevissima</i>          |     |   |     |      | X <sup>V</sup> | X <sup>V</sup> |
| <i>P. capax</i>               |     |   |     |      |                | X <sup>V</sup> |
| <i>P. purpurata</i>           |     |   |     |      |                |                |
| <i>Leptodea fragilis</i>      |     |   |     |      | X <sup>V</sup> | X <sup>V</sup> |
| <i>L. leptodon</i>            |     |   |     |      |                | X <sup>V</sup> |
| <i>Ellipsaria lineolata</i>   |     |   |     |      | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Truncilla truncata</i>   | 6   |   | 6   | 0.5  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>T. donaciformis</i>      | 2   |   | 2   | 0.2  | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Obovaria olivaria</i>    | 33  |   | 33  | 2.9  | X <sup>V</sup> | X <sup>V</sup> |
| <i>Actinonaias carinata</i>   |     |   |     |      |                | X <sup>V</sup> |
| <i>A. ellipsiformis</i>       |     |   |     |      |                |                |

|   | A | J | T | %   | R              | H              |
|---|---|---|---|-----|----------------|----------------|
| X <i>Ligumia recta</i>                  | 4 |   | 4 | 0.4 | X <sup>V</sup> | X <sup>V</sup> |
| <i>L. subrostrata</i>                   |   |   |   |     | X <sup>V</sup> | X <sup>V</sup> |
| X <sup>H</sup> <i>Carunculina parva</i> |   |   |   |     | X <sup>V</sup> | X <sup>V</sup> |
| <i>Lampsilis teres</i>                  |   |   |   |     |                |                |
| X <sup>1</sup> <i>L. higginsii</i>      |   |   |   |     | X <sup>V</sup> | X <sup>V</sup> |
| <i>L. radiata siliquoidea</i>           |   |   |   |     |                | X <sup>V</sup> |
| X <i>L. ovata ventricosa</i>            | 4 |   | 4 | 0.4 | X <sup>V</sup> | X <sup>V</sup> |
| <i>Plagiola triquetra</i>               |   |   |   |     |                | X <sup>H</sup> |
| X <i>Arcidens confragosus</i>           | 3 |   | 3 | 0.3 | X <sup>V</sup> | X <sup>V</sup> |
| <i>Lasmigona complanata</i>             |   |   |   |     | X <sup>V</sup> | X <sup>V</sup> |
| <i>L. costata</i>                       |   |   |   |     |                | X <sup>V</sup> |
| <i>L. compressa</i>                     |   |   |   |     |                | X              |
| <i>Alasmidonta marginata</i>            |   |   |   |     |                | X <sup>V</sup> |
| <i>A. viridis</i>                       |   |   |   |     |                | X <sup>V</sup> |
| <i>Simpsoniconcha ambigua</i>           |   |   |   |     |                |                |
| <i>Anodontoides ferussacianus</i>       |   |   |   |     |                |                |
| <i>Anodonta suborbiculata</i>           |   |   |   |     |                |                |
| X <i>A. imbecillis</i>                  | 1 |   | 1 | 0.1 | X <sup>V</sup> | X <sup>V</sup> |
| X <i>A. grandis</i>                     | 5 |   | 5 | 0.4 | X <sup>V</sup> | X <sup>V</sup> |
| X <i>Strophitus undulatus</i>           | 1 |   | 1 | 0.1 | X <sup>V</sup> | X <sup>V</sup> |

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|    |                   |   |                   |       |    |                 |
|----|-------------------|---|-------------------|-------|----|-----------------|
| 21 | 1124 <sup>3</sup> | 0 | 1124 <sup>3</sup> | 100.0 | 29 | 42 <sup>2</sup> |
|----|-------------------|---|-------------------|-------|----|-----------------|

Notes:

<sup>1</sup> See note 1, Exhibit 98.

<sup>2</sup> A "bone" fragment of *Quadrula fragosa* recently was found at Prairie du Chien in material dredged by the Corps in 1976 (M.E. Havlik, Malacological Consultants, La Crosse, Wisconsin, personal communication). This discovery is included in the H column total.

<sup>3</sup> To the taxon totals should be added two *Elliptio dilatata* and one *Protera alata* collected by the Academy in 1977, but not recorded by Fuller (1978b).

## EXHIBIT 189

## 95. Prairie du Chien Commercial and Small Boat Harbors

Site data: Exhibit(s) 84

Map(s): Exhibit(s) 206, 248

|                               | A | J  | T  | %    | R | H |
|-------------------------------|---|----|----|------|---|---|
| <i>Cumberlandia monodonta</i> |   |    |    |      |   |   |
| <i>Quadrula metanevra</i>     |   |    |    |      |   |   |
| <i>Q. quadrula</i>            |   |    |    |      |   |   |
| <i>Q. nodulata</i>            |   |    |    |      |   |   |
| <i>Q. pustulosa</i>           |   |    |    |      |   |   |
| <i>Tritogonia verrucosa</i>   |   |    |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |    |    |      |   |   |
| <i>Fusconaia flava</i>        |   |    |    |      |   |   |
| <i>F. ebena</i>               |   |    |    |      |   |   |
| <i>Megalonaias gigantea</i>   |   |    |    |      |   |   |
| X <i>Amblema plicata</i>      |   | 4* | 4  | 4.9  |   |   |
| <i>Plethobasus cyphus</i>     |   |    |    |      |   |   |
| <i>Pleurobema cordatum</i>    |   |    |    |      |   |   |
| <i>Elliptio crassidens</i>    |   |    |    |      |   |   |
| <i>E. dilatata</i>            |   |    |    |      |   |   |
| <i>Obliquaria reflexa</i>     |   |    |    |      |   |   |
| <i>Proptera alata</i>         |   |    |    |      |   |   |
| <i>P. laevissima</i>          |   |    |    |      |   |   |
| <i>P. capax</i>               |   |    |    |      |   |   |
| <i>P. purpurata</i>           |   |    |    |      |   |   |
| X <i>Leptodea fragilis</i>    |   | 1  | 1  | 1.2  |   |   |
| <i>L. leptodon</i>            |   |    |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |    |    |      |   |   |
| <i>Truncilla truncata</i>     |   |    |    |      |   |   |
| X <i>T. donaciiformis</i>     |   | 12 | 12 | 14.6 |   |   |
| <i>Obovaria olivaria</i>      |   |    |    |      |   |   |
| <i>Actinonaias carinata</i>   |   |    |    |      |   |   |
| <i>A. ellipsiformis</i>       |   |    |    |      |   |   |

\* Small size and incompletely developed beak sculpture of these juveniles has prevented their unequivocal identification; some or all may be *Fusconaia flava*.

|                                   | A | J  | T  | %     | R | H |
|-----------------------------------|---|----|----|-------|---|---|
| <i>Ligumia recta</i>              |   |    |    |       |   |   |
| <i>L. subrostrata</i>             |   |    |    |       |   |   |
| X <i>Caminculina parva</i>        |   | 65 | 65 | 79.3  |   |   |
| <i>Lampsilis teres</i>            |   |    |    |       |   |   |
| <i>L. higginsii</i>               |   |    |    |       |   |   |
| <i>L. radiata siliquioidea</i>    |   |    |    |       |   |   |
| <i>L. ovata ventricosa</i>        |   |    |    |       |   |   |
| <i>Plagiola triquetra</i>         |   |    |    |       |   |   |
| <i>Arcidens confragosus</i>       |   |    |    |       |   |   |
| <i>Lasmigona complanata</i>       |   |    |    |       |   |   |
| <i>L. costata</i>                 |   |    |    |       |   |   |
| <i>L. compressa</i>               |   |    |    |       |   |   |
| <i>Alasmidonta marginata</i>      |   |    |    |       |   |   |
| <i>A. viridis</i>                 |   |    |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |   |    |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |   |    |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |   |    |    |       |   |   |
| <i>A. imbecillis</i>              |   |    |    |       |   |   |
| <i>A. grandis</i>                 |   |    |    |       |   |   |
| <i>Strophitus undulatus</i>       |   |    |    |       |   |   |
| 4                                 | 0 | 82 | 82 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 190

96. McGregor

Site data: Exhibit(s) 85

Map(s): Exhibit(s) 206, 248

|                               | A   | J | T   | %    | R | H |
|-------------------------------|-----|---|-----|------|---|---|
| <i>Cumberlandia monodonta</i> |     |   |     |      |   |   |
| <i>Quadrula metanevra</i>     |     |   |     |      |   |   |
| X <i>Q. quadrula</i>          | 3   |   | 3   | 1.5  |   |   |
| <i>Q. nodulata</i>            |     |   |     |      |   |   |
| X <i>Q. pustulosa</i>         | 9   |   | 9   | 4.5  |   |   |
| <i>Tritogonia verrucosa</i>   |     |   |     |      |   |   |
| <i>Cyclonaias tuberculata</i> |     |   |     |      |   |   |
| X <i>Fusconaia flava</i>      | 3   |   | 3   | 1.5  |   |   |
| <i>F. ebena</i>               |     |   |     |      |   |   |
| X <i>Megalonaias gigantea</i> | 1   |   | 1   | 0.5  |   |   |
| X <i>Ambelma plicata</i>      | 163 |   | 163 | 81.1 |   |   |
| <i>Plethobasus cyphus</i>     |     |   |     |      |   |   |
| <i>Pleurobema cordatum</i>    |     |   |     |      |   |   |
| <i>Elliptio crassidens</i>    |     |   |     |      |   |   |
| X <i>E. dilatata</i>          | 2   |   | 2   | 1.0  |   |   |
| X <i>Obliquaria reflexa</i>   | 6   |   | 6   | 3.0  |   |   |
| X <i>Proptera alata</i>       | 1   |   | 1   | 0.5  |   |   |
| <i>P. laevissima</i>          |     |   |     |      |   |   |
| <i>P. capax</i>               |     |   |     |      |   |   |
| <i>P. purpurata</i>           |     |   |     |      |   |   |
| <i>Leptodea fragilis</i>      |     |   |     |      |   |   |
| <i>L. leptodon</i>            |     |   |     |      |   |   |
| <i>Ellipsaria lineolata</i>   |     |   |     |      |   |   |
| <i>Truncilla truncata</i>     |     |   |     |      |   |   |
| X <i>T. donaciformis</i>      |     | 7 | 7   | 3.5  |   |   |
| X <i>Obovaria olivaria</i>    | 2   |   | 2   | 1.0  |   |   |
| <i>Actinonaias carinata</i>   |     |   |     |      |   |   |
| <i>A. ellipsiformis</i>       |     |   |     |      |   |   |

|                                   | A   | J | T   | %     | R | H |
|-----------------------------------|-----|---|-----|-------|---|---|
| <i>Ligumia recta</i>              |     |   |     |       |   |   |
| <i>L. subrostrata</i>             |     |   |     |       |   |   |
| <i>Carunculina parva</i>          |     |   |     |       |   |   |
| <i>Lampsilis teres</i>            |     |   |     |       |   |   |
| <i>L. higginsii</i>               |     |   |     |       |   |   |
| <i>L. radiata siliquioidea</i>    |     |   |     |       |   |   |
| <i>L. ovata ventricosa</i>        |     |   |     |       |   |   |
| <i>Plagiola triquetra</i>         |     |   |     |       |   |   |
| X <i>Arcidens confragosus</i>     | 4   |   | 4   | 2.0   |   |   |
| <i>Lasmigona complanata</i>       |     |   |     |       |   |   |
| <i>L. costata</i>                 |     |   |     |       |   |   |
| <i>L. compressa</i>               |     |   |     |       |   |   |
| <i>Alasmidonta marginata</i>      |     |   |     |       |   |   |
| <i>A. viridis</i>                 |     |   |     |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |     |   |     |       |   |   |
| <i>Anodontoides ferussacianus</i> |     |   |     |       |   |   |
| <i>Anodonta suborbiculata</i>     |     |   |     |       |   |   |
| <i>A. imbecillis</i>              |     |   |     |       |   |   |
| <i>A. grandis</i>                 |     |   |     |       |   |   |
| <i>Strophitus undulatus</i>       |     |   |     |       |   |   |
| 11                                | 194 | 7 | 201 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 191

## 97, Wyalusing Bend Light

Site data: Exhibit(s) 86

Map(s): Exhibit(s) 206, 249

|                               | A | J | T | %    | R | H |
|-------------------------------|---|---|---|------|---|---|
| <i>Cumberlandia monodonta</i> |   |   |   |      |   |   |
| <i>Quadrula metanevra</i>     |   |   |   |      |   |   |
| X <i>Q. quadrula</i>          |   |   |   |      |   |   |
| X <i>Q. nodulata</i>          | 1 |   | 1 | 4.8  |   |   |
| X <i>Q. pustulosa</i>         | 4 |   | 4 | 19.0 |   |   |
| <i>Tritogonia verrucosa</i>   |   |   |   |      |   |   |
| <i>Cyclonaias tuberculata</i> |   |   |   |      |   |   |
| X <i>Fusconaia flava</i>      | 2 |   | 2 | 9.5  |   |   |
| <i>F. ebena</i>               |   |   |   |      |   |   |
| <i>Megalonaias gigantea</i>   |   |   |   |      |   |   |
| X <i>Amblema plicata</i>      | 9 |   | 9 | 42.9 |   |   |
| <i>Plethobasus cyphus</i>     |   |   |   |      |   |   |
| <i>Pleurobema cordatum</i>    |   |   |   |      |   |   |
| <i>Elliptio crassidens</i>    |   |   |   |      |   |   |
| <i>E. dilatata</i>            |   |   |   |      |   |   |
| <i>Obliquaria reflexa</i>     |   |   |   |      |   |   |
| <i>Proptera alata</i>         |   |   |   |      |   |   |
| <i>P. laevissima</i>          |   |   |   |      |   |   |
| <i>P. capax</i>               |   |   |   |      |   |   |
| <i>P. purpurata</i>           |   |   |   |      |   |   |
| <i>Leptodea fragilis</i>      |   |   |   |      |   |   |
| <i>L. leptodon</i>            |   |   |   |      |   |   |
| <i>Ellipsaria lineolata</i>   |   |   |   |      |   |   |
| <i>Truncilla truncata</i>     |   |   |   |      |   |   |
| X <i>T. donaciformis</i>      | 1 |   | 1 | 4.8  |   |   |
| X <i>Obovaria olivaria</i>    | 2 |   | 2 | 9.5  |   |   |
| <i>Actinonaias carinata</i>   |   |   |   |      |   |   |
| <i>A. ellipsiformis</i>       |   |   |   |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Liguria recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Camunculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| X <i>L. radiata siliquoidea</i>   | 1  |   | 1  | 4.8   |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| <i>Arcidens confragosus</i>       |    |   |    |       |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| <i>A. imbecillis</i>              |    |   |    |       |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| X <i>Strophitus undulatus</i>     | 1  |   | 1  | 4.8   |   |   |
| 8                                 | 21 | 0 | 21 | 100.0 | 0 | 0 |

Notes:



# EXHIBIT 192

## 98. Wyalusing

Site data: Exhibit(s) 87

Map(s): Exhibit(s) 206, 249

|                               | A  | J | T  | 3    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 4  |   | 4  | 6.6  |   |   |
| X <i>Q. nodulata</i>          | 2  |   | 2  | 3.3  |   |   |
| X <i>Q. pustul</i>            | 7  |   | 7  | 11.5 |   |   |
| <i>Tritogonia . frucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| <i>Fusconaia flava</i>        |    |   |    |      |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| <i>Megalonaias gigantea</i>   |    |   |    |      |   |   |
| X <i>Amblema plicata</i>      | 31 |   | 31 | 50.8 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassifens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 6  |   | 6  | 9.8  |   |   |
| X <i>Proptera alba</i>        | 1  |   | 1  | 1.6  |   |   |
| <i>P. laevissima</i>          |    |   |    |      |   |   |
| <i>P. expax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| <i>Leptodea fragilis</i>      |    |   |    |      |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 1  |   | 1  | 1.6  |   |   |
| X <i>T. donaciiformis</i>     | 1  |   | 1  | 1.6  |   |   |
| X <i>Obovaria obovaria</i>    | 4  |   | 4  | 6.6  |   |   |
| <i>Actinonaias varinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                   | A  | J | T  | %     | R | H |
|-----------------------------------|----|---|----|-------|---|---|
| <i>Ligumia recta</i>              |    |   |    |       |   |   |
| <i>L. subrostrata</i>             |    |   |    |       |   |   |
| <i>Carunculina parva</i>          |    |   |    |       |   |   |
| <i>Lampsilis teres</i>            |    |   |    |       |   |   |
| <i>L. higginsii</i>               |    |   |    |       |   |   |
| <i>L. radiata siliquoides</i>     |    |   |    |       |   |   |
| <i>L. ovata ventricosa</i>        |    |   |    |       |   |   |
| <i>Plagiola triquetra</i>         |    |   |    |       |   |   |
| X <i>Arcidens confragosus</i>     | 3  |   | 3  | 4.9   |   |   |
| <i>Lasmigona complanata</i>       |    |   |    |       |   |   |
| <i>L. costata</i>                 |    |   |    |       |   |   |
| <i>L. compressa</i>               |    |   |    |       |   |   |
| <i>Alasmidonta marginata</i>      |    |   |    |       |   |   |
| <i>A. viridis</i>                 |    |   |    |       |   |   |
| <i>Simpsoniconcha ambigua</i>     |    |   |    |       |   |   |
| <i>Anodontoides ferussacianus</i> |    |   |    |       |   |   |
| <i>Anodonta suborbiculata</i>     |    |   |    |       |   |   |
| X <i>A. imbecillis</i>            | 1  |   | 1  | 1.6   |   |   |
| <i>A. grandis</i>                 |    |   |    |       |   |   |
| <i>Strophitus undulatus</i>       |    |   |    |       |   |   |
| 11                                | 61 | 0 | 61 | 100.0 | 0 | 0 |

Notes:

## EXHIBIT 193

## 99. McMillan Island

Site data: Exhibit(s) 88

Map(s): Exhibit(s) 206, 250

|                               | A  | J | T  | %    | R | H |
|-------------------------------|----|---|----|------|---|---|
| <i>Cumberlandia monodonta</i> |    |   |    |      |   |   |
| <i>Quadrula metanevra</i>     |    |   |    |      |   |   |
| X <i>Q. quadrula</i>          | 19 |   | 19 | 8.4  |   |   |
| X <i>Q. nodulata</i>          | 41 |   | 41 | 18.2 |   |   |
| X <i>Q. pustulosa</i>         | 27 |   | 27 | 12.0 |   |   |
| <i>Tritogonia verrucosa</i>   |    |   |    |      |   |   |
| <i>Cyclonaias tuberculata</i> |    |   |    |      |   |   |
| X <i>Fusconaia flava</i>      | 13 |   | 13 | 5.8  |   |   |
| <i>F. ebena</i>               |    |   |    |      |   |   |
| X <i>Megalonaias gigantea</i> | 1  |   | 1  | 0.4  |   |   |
| X <i>Ambelma plicata</i>      | 58 |   | 58 | 25.8 |   |   |
| <i>Plethobasus cyphus</i>     |    |   |    |      |   |   |
| <i>Pleurobema cordatum</i>    |    |   |    |      |   |   |
| <i>Elliptio crassidens</i>    |    |   |    |      |   |   |
| <i>E. dilatata</i>            |    |   |    |      |   |   |
| X <i>Obliquaria reflexa</i>   | 10 |   | 10 | 4.4  |   |   |
| X <i>Proptera alata</i>       | 1  |   | 1  | 0.4  |   |   |
| X <i>P. laevissima</i>        | 2  |   | 2  | 0.9  |   |   |
| <i>P. capax</i>               |    |   |    |      |   |   |
| <i>P. purpurata</i>           |    |   |    |      |   |   |
| X <i>Leptodea fragilis</i>    | 13 |   | 13 | 5.8  |   |   |
| <i>L. leptodon</i>            |    |   |    |      |   |   |
| <i>Ellipsaria lineolata</i>   |    |   |    |      |   |   |
| X <i>Truncilla truncata</i>   | 2  |   | 2  | 0.9  |   |   |
| X <i>T. donaciformis</i>      | 14 |   | 14 | 6.2  |   |   |
| X <i>Obovaria olivaria</i>    | 10 |   | 10 | 4.4  |   |   |
| <i>Actinonaias carinata</i>   |    |   |    |      |   |   |
| <i>A. ellipsiformis</i>       |    |   |    |      |   |   |

|                                    | A | J | T | %   | R | H |
|------------------------------------|---|---|---|-----|---|---|
| <i>Ligumia recta</i>               |   |   |   |     |   |   |
| <i>L. subrostrata</i>              |   |   |   |     |   |   |
| X <i>Carunculina parva</i>         | 4 |   | 4 | 1.8 |   |   |
| X <i>Lampsilis teres</i>           | 1 |   | 1 | 0.4 |   |   |
| X <sup>1</sup> <i>L. higginsii</i> |   |   |   |     |   |   |
| X <i>L. radiata siliquoidea</i>    | 6 |   | 6 | 2.7 |   |   |
| X <i>L. ovata ventricosa</i>       | 1 |   | 1 | 0.4 |   |   |
| <i>Plagiola triquetra</i>          |   |   |   |     |   |   |
| X <i>Arcidens confragosus</i>      | 2 |   | 2 | 0.9 |   |   |
| <i>Lasmigona complanata</i>        |   |   |   |     |   |   |
| <i>L. costata</i>                  |   |   |   |     |   |   |
| <i>L. compressa</i>                |   |   |   |     |   |   |
| <i>Alasmidonta marginata</i>       |   |   |   |     |   |   |
| <i>A. viridis</i>                  |   |   |   |     |   |   |
| <i>Simpsoniconcha ambigua</i>      |   |   |   |     |   |   |
| <i>Anodontoides ferussacianus</i>  |   |   |   |     |   |   |
| <i>Anodonta suborbiculata</i>      |   |   |   |     |   |   |
| <i>A. imbecillis</i>               |   |   |   |     |   |   |
| <i>A. grandis</i>                  |   |   |   |     |   |   |
| <i>Strophitus undulatus</i>        |   |   |   |     |   |   |

19

225

0

225

100.0

0

0

#### Notes:

- <sup>1</sup> The St. Paul District's Corps mussel survey crew found a living Higgins' Eye near McMillan Island in August 1980.

## EXHIBIT 194

## 100. Locks and Dam 10 Upper Approach

Site data: Exhibit(s) 89

Map(s): Exhibit(s) 206, 251

|       | A                             | J  | T  | %    | R | H |
|-------|-------------------------------|----|----|------|---|---|
| <hr/> |                               |    |    |      |   |   |
|       | <i>Cumberlandia monodonta</i> |    |    |      |   |   |
|       | <i>Quadrula metanevra</i>     |    |    |      |   |   |
| X     | <i>Q. quadrula</i>            | 5  | 5  | 13.5 |   |   |
| X     | <i>Q. nodulata</i>            | 8  | 8  | 21.6 |   |   |
|       | <i>Q. pustulosa</i>           |    |    |      |   |   |
|       | <i>Tritogonia verrucosa</i>   |    |    |      |   |   |
|       | <i>Cyclonaias tuberculata</i> |    |    |      |   |   |
| X     | <i>Fusconaia flava</i>        | 3  | 3  | 8.1  |   |   |
|       | <i>F. ebena</i>               |    |    |      |   |   |
|       | <i>Megalonaias gigantea</i>   |    |    |      |   |   |
| X     | <i>Ambelma plicata</i>        | 15 | 15 | 40.5 |   |   |
|       | <i>Plethobasus cyphus</i>     |    |    |      |   |   |
|       | <i>Pleurobema cordatum</i>    |    |    |      |   |   |
|       | <i>Elliptio crassidens</i>    |    |    |      |   |   |
|       | <i>E. dilatata</i>            |    |    |      |   |   |
| X     | <i>Obliquaria reflexa</i>     | 1  | 1  | 2.7  |   |   |
|       | <i>Proptera alata</i>         |    |    |      |   |   |
|       | <i>P. laevissima</i>          |    |    |      |   |   |
|       | <i>P. capax</i>               |    |    |      |   |   |
|       | <i>P. purpurata</i>           |    |    |      |   |   |
|       | <i>Leptodea fragilis</i>      |    |    |      |   |   |
|       | <i>L. leptodon</i>            |    |    |      |   |   |
|       | <i>Ellipsaria lineolata</i>   |    |    |      |   |   |
| X     | <i>Truncilla truncata</i>     | 2  | 2  | 5.4  |   |   |
| X     | <i>T. donaciiformis</i>       | 2  | 2  | 5.4  |   |   |
| X     | <i>Obovaria olivaria</i>      | 1  | 1  | 2.7  |   |   |
|       | <i>Actinonaias carinata</i>   |    |    |      |   |   |
|       | <i>A. ellipsiformis</i>       |    |    |      |   |   |

A J T % R H

*Ligumia recta*

*L. subrostrata*

*Carunculina parva*

*Lampsilis teres*

*L. higginsii*

*L. radiata siliquoidea*

*L. ovata ventricosa*

*Plagiola triquetra*

*Arcidens confragosus*

*Lasmigona complanata*

*L. costata*

*L. compressa*

*Alasmidonta marginata*

*A. viridis*

*Simpsoniconcha ambigua*

*Anodontoides ferussacianus*

*Anodonta suborbiculata*

*A. imbecillis*

*A. grandis*

*Strophitus undulatus*

---

8

37

0

37

100.0

0

0

Notes:

## Appendix D

### Maps

#### Exhibits 195-251

This Appendix contains maps of the river reaches, navigation pools, and individual sites surveyed by the Academy in 1977 through 1979. Exhibits 195 through 206 essentially are redrawn from maps in the St. Paul District's Environmental Impact Statement about O & M activities (USACE, 1974b). Exhibits 207 through 251 essentially are photostats of the Corps UMR drainage navigation charts (USACE, 1975).

## Exhibit 195

### Study Area

The map is drawn to a scale too small for portrayal of all prominent landmarks in the study area (e.g., rivers, locks and dams, municipalities). The three-digit number in each rectangle refers to one of the next 11 exhibits, in which that part of the study area lying within the rectangle is drawn to a much larger scale.

The one- and two-digit numbers refer to the following list of landmarks, most of which were chosen for this map because they are municipalities of special significance in this study (a locks and dam installation is located there and/or much field work was conducted in the vicinity).

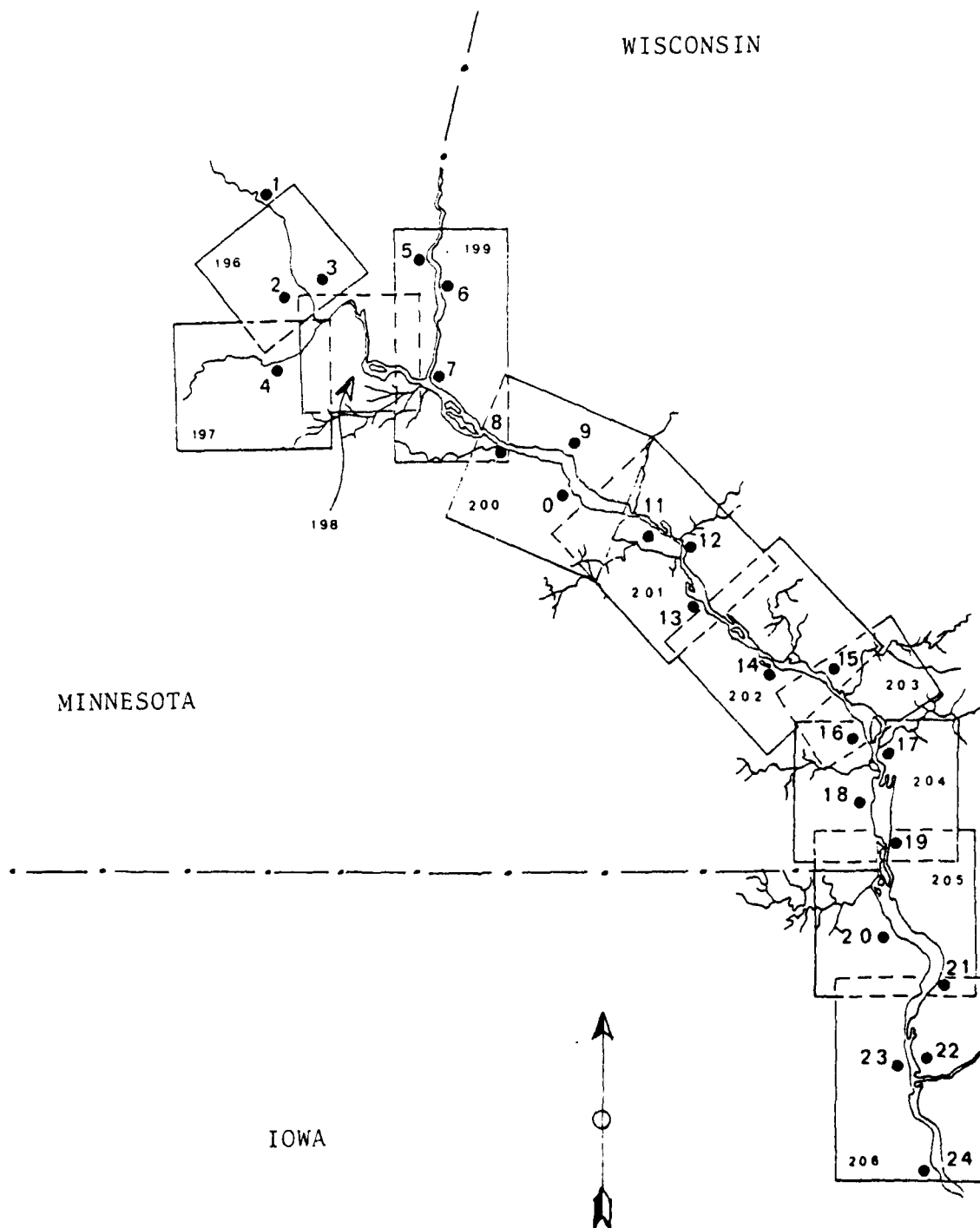
1. Anoka
2. Minneapolis (Upper and Lower St. Anthony Falls Locks and Dams)
3. St. Paul (Locks and Dam 1)
4. Savage
5. Stillwater
6. Hudson
7. Prescott (Locks and Dam 2 upstream)
8. Red Wing (Locks and Dam 3 upstream)
9. Maiden Rock
10. Lake City
11. Wabasha
12. Alma (Locks and Dam 4)
13. Minneiska (Locks and Dam 5)
14. Winona (Locks and Dam 5A)
15. Trempealeau (Locks and Dam 6)
16. Dresbach (Locks and Dam 7)
17. La Crosse



18. Brownsville
19. Genoa (Locks and Dam 8)
20. Lansing
21. Lynxville (Locks and Dam 9 downstream)
22. Prairie du Chien
23. McGregor
24. Guttenberg (Locks and Dam 10)

Exhibit 195

Study Area



## Exhibits 196-206

### Upper Mississippi River Pools and Minnesota, St. Croix, and Black Rivers

The next 11 maps portray the contents of the rectangles in Exhibit 195 on a larger scale.

The larger, one-, two-, or three-digit numbers refer to the Sites listed below. The smaller, underscored, three-digit numbers refer to river miles evenly divisible by five, which are portrayed by dots within squares. Other river miles are indicated by dots. The 9-Foot Navigation Channel follows the lines connecting the dots.

(The only exception to these remarks involves RM 795 between Locks and Dam 3 and Red Wing, Minnesota (Exhibit 200). Mile 795 lies in a side channel, probably because the main channel once was there, but later was relocated in order to shorten navigation distance. As a result, between RM 790 and 800 there no longer are precisely 10 miles, and locations in the modern channel that lie in that reach cannot be specified in terms of river mileage unless a few tenths of a mile are assumed not to exist. Fortunately, the Academy studied no sites in this reach.)

Upper and Lower St. Anthony Falls and Locks and Dam are represented by the respective acronyms USAF, LSAF, and L/D. The directional arrows bear north.

The following list correlates the name and number of each Site with the number(s) of the exhibit(s) presenting map(s) of that Site.

|                       |          |
|-----------------------|----------|
| Study Area            | 195      |
| Minnesota River       | 197, 207 |
| 1. Cargill            | 197, 207 |
| 2. Petersons Bar      | 197, 207 |
| 3. Route I-35W Bridge | 197, 207 |
| St. Croix River       | 199      |
| 4. Stillwater         | 199, 208 |
| 5. Hudson             | 199, 209 |
| 6. Catfish Bar        | 199, 210 |

|  |               |
|--|---------------|
| 7. Kinnickinnic                                    | 199, 211      |
| Black River  | 203, 204      |
| Upper Mississippi River                            | 195           |
| Upper St. Anthony Falls Pool                       | 196           |
| 8. SOO Line Railroad Bridge                        | 196, 212      |
| 9. Broadway Avenue and Plymouth Avenue<br>Bridges  | 196, 212      |
| Lower St. Anthony Falls Pool                       | 196           |
| Pool 1   | 196           |
| 10. Lake Street Bridge                             | 196, 213      |
| 11. St. Paul Daymark 849.1                         | 196, 213      |
| 12. Locks and Dam 1 Upper Approach<br>Construction | 196, 198, 213 |
| Pool 2   | 198           |
| 13. Smith Avenue ("High") Bridge                   | 198, 214      |
| 14. Robinsons Rocks                                | 198, 215      |
| 15. Nininger                                       | 198, 216      |
| Pool 3   | 199           |
| 16. Vermillion River                               | 199, 216      |
| 17. Hastings Small Boat Harbor                     | 199, 216      |
| 18. Prescott                                       | 199, 217      |
| 19. Pine Coulee                                    | 199, 217      |
| 20. Truedale Slough                                | 199, 217      |
| 21. Four Mile Island                               | 199, 217      |
| 22. Big River                                      | 199, 218      |
| 23. Morgan Coulee                                  | 199, 219      |
| 24. Coulters Island                                | 199, 219      |
| 25. Below Diamond Bluff                            | 199, 219      |

|   |               |
|---|---------------|
| Pool 4  | 200, 201      |
| 26. Above Trenton   | 200, 220      |
| 27. Trenton   | 200, 220      |
| 28. Cannon River  | 200, 220      |
| 29. Red Wing Commercial and Small Boat Harbors                  | 200, 220      |
| 30. Red Wing Highway Bridge                                     | 200, 221      |
| 31. Bay City Small Boat Harbor                                  | 200, 222      |
| 32. Bay City Commercial and Recreational Sites                  | 200, 222      |
| 33. Wacouta Point   | 200, 222      |
| 34. Lake City Small Boat Harbor                                 | 200, 223      |
| 35. Reads Landing   | 201, 224      |
| 36. Wabasha Small Boat Harbor                                   | 201, 224      |
| 37. Crats Island Bank Repair                                    | 201, 224      |
| 38. Teepeeota Point   | 201, 225      |
| 39. Grand Encampment  | 201, 225      |
| 40. Beef Slough   | 201, 225      |
| Pool 5  | 201           |
| 41. Locks and Dam 4 Lower Approach                              | 201, 226      |
| 42. Mule Bend   | 201, 226      |
| 43. Head of Island 42 Bank Repair                               | 201, 226      |
| 44. West Newton   | 201, 227      |
| 45. Weaver Bottoms Complex                                      | 201, 228      |
| 46. Locks and Dam 5 Culvert Construction                        | 201, 202, 229 |
| Pool 5A   | 202           |
| 47. Locks and Dam 5 Lower Approach                              | 202, 229      |
| 48, 49, 50. Island 58, Island 58 Bank Repair, and Fountain City | 202, 230      |

|   |          |
|---|----------|
| 51. Fountain City Service Base  | 202, 230 |
| 52. Fountain City Small Boat Harbor                                   | 202, 230 |
| 53, 54, 55. Betsy Slough, Betsy Slough Bank<br>Repair, and Wilds Bend | 202, 230 |
| 56. Locks and Dam 5A Upper Approach                                   | 202, 231 |
| Pool 6  | 202      |
| 57. Locks and Dam 5A Lower Approach                                   | 202, 231 |
| 58. Winona Commercial Harbor and Small<br>Boat Harbors                | 202, 232 |
| 59. Winona Lower Railroad Bridge                                      | 202, 232 |
| 60. Gravel Point  | 202, 232 |
| Pool 7  | 203      |
| 61. Locks and Dam 6 Lower Approach                                    | 203, 233 |
| 62. Richmond Island   | 203, 233 |
| 63. Queens Bluff  | 203, 233 |
| 64. Locks and Dam 7 Upper Approach                                    | 203, 234 |
| Pool 8  | 204      |
| 65. La Crosse Railroad Bridge   | 204, 235 |
| 66. Hingen Island Bank Repair   | 204, 236 |
| 67, 68. Sand Slough and Sand Slough Bank<br>Repair                    | 204, 236 |
| 69. Root River  | 204, 237 |
| 70. Picayune Island   | 204, 237 |
| 71. Above Brownsville   | 204, 237 |
| 72. Brownsville   | 204, 238 |
| 73. Crosby Slough   | 204, 239 |
| 74. Warners Landing   | 204, 239 |
| Pool 9  | 205      |

|  |          |
|--|----------|
| 75, 76. Island 126 and Head of Island 126<br>Bank Repair                       | 205, 240 |
| 77, 78. Twin Island and Head of Twin<br>Island Bank Repair                     | 205, 240 |
| 79. Below Twin Island  | 205, 240 |
| 80. Battle Island  | 205, 241 |
| 81. DeSoto   | 205, 242 |
| 82, 83. Above Indian Camp Light and Mouth<br>of Hummingbird Slough Bank Repair | 205, 243 |
| 84. Indian Camp Light  | 205, 243 |
| 85. Lansing Upper Light  | 205, 243 |
| 86. Lansing Small Boat Harbor  | 205, 243 |
| 87. Atchafalaya  | 205, 244 |
| 88. Crooked Slough Cut   | 205, 245 |
| 89. Locks and Dam 9 Upper Approach   | 205, 246 |
| Pool 10  | 206      |
| 90. Locks and Dam 9 Lower Approach   | 206, 246 |
| 91. Hay Point Bank Repair  | 206, 246 |
| 92. Jackson Island   | 206, 247 |
| 93. Mississippi Gardens  | 206, 247 |
| 94. Prairie du Chien East Channel  | 206, 248 |
| 95. Prairie du Chien Commercial and Small<br>Boat Harbors                      | 206, 248 |
| 96. McGregor   | 206, 248 |
| 97. Wyalusing Bend Light   | 206, 249 |
| 98. Wyalusing  | 206, 249 |
| 99. McMillan Island  | 206, 250 |
| 100. Locks and Dam 10 Upper Approach   | 206, 251 |

AD-A097 003

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA PA DIV OF--ETC F/G 6/6  
FRESHWATER MUSSELS (MOLLUSCA: BIVALVIA: UNIONIDAE) OF THE UPPER--ETC(U)  
SEP 80 S L FULLER

UNCLASSIFIED 79-24F-VOL-2

NL

4 OF 5

AD-A097003

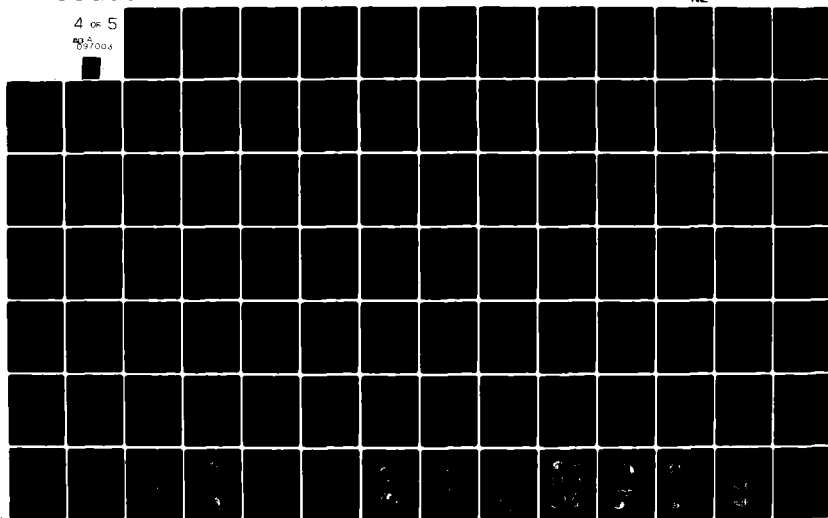




Exhibit 196

Upper Mississippi River Sites 8-12

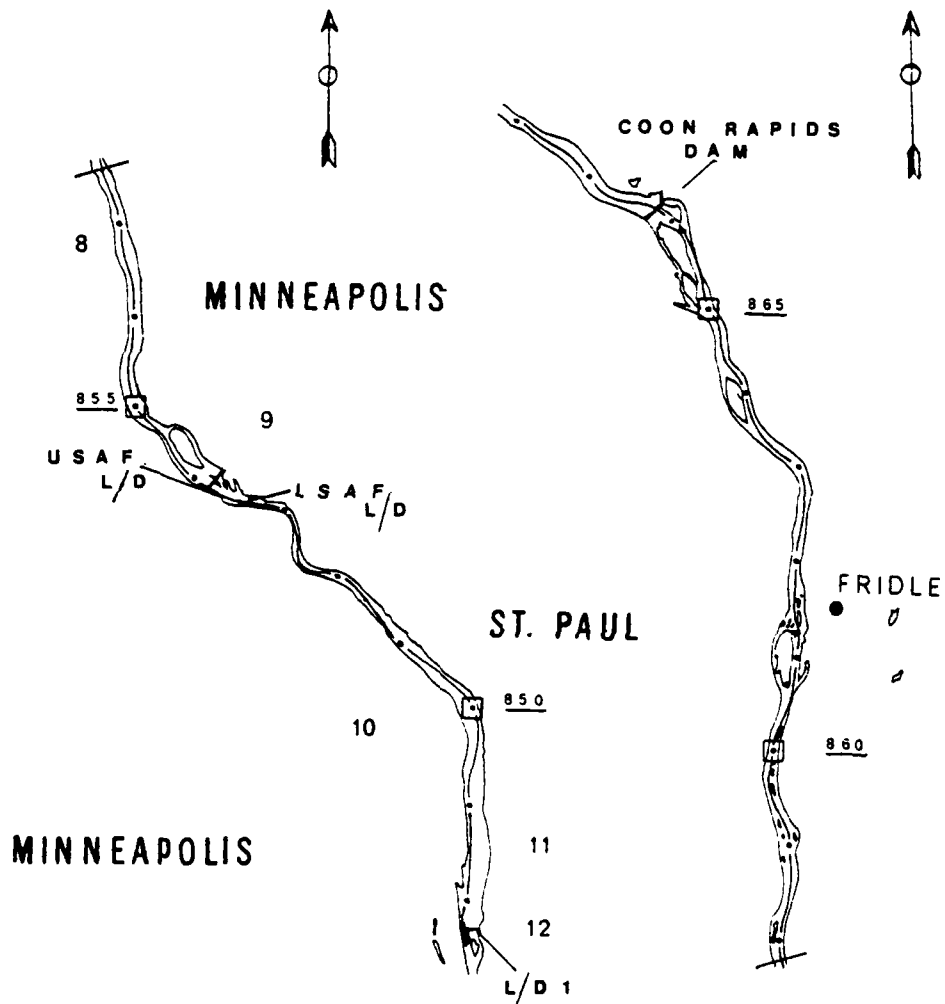


Exhibit 197

Minnesota River Sites 1-3

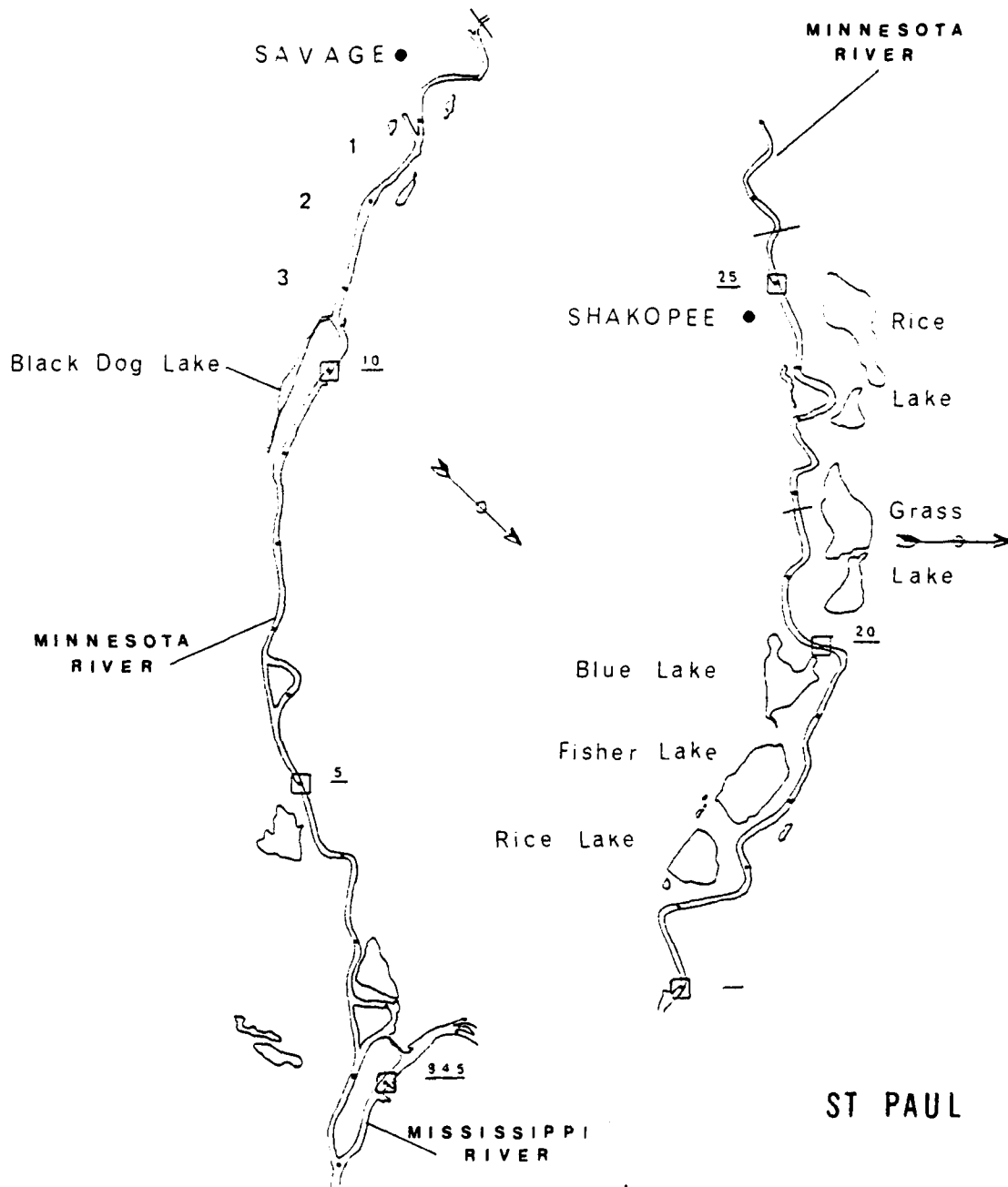


Exhibit 198

Upper Mississippi River Sites 12-15

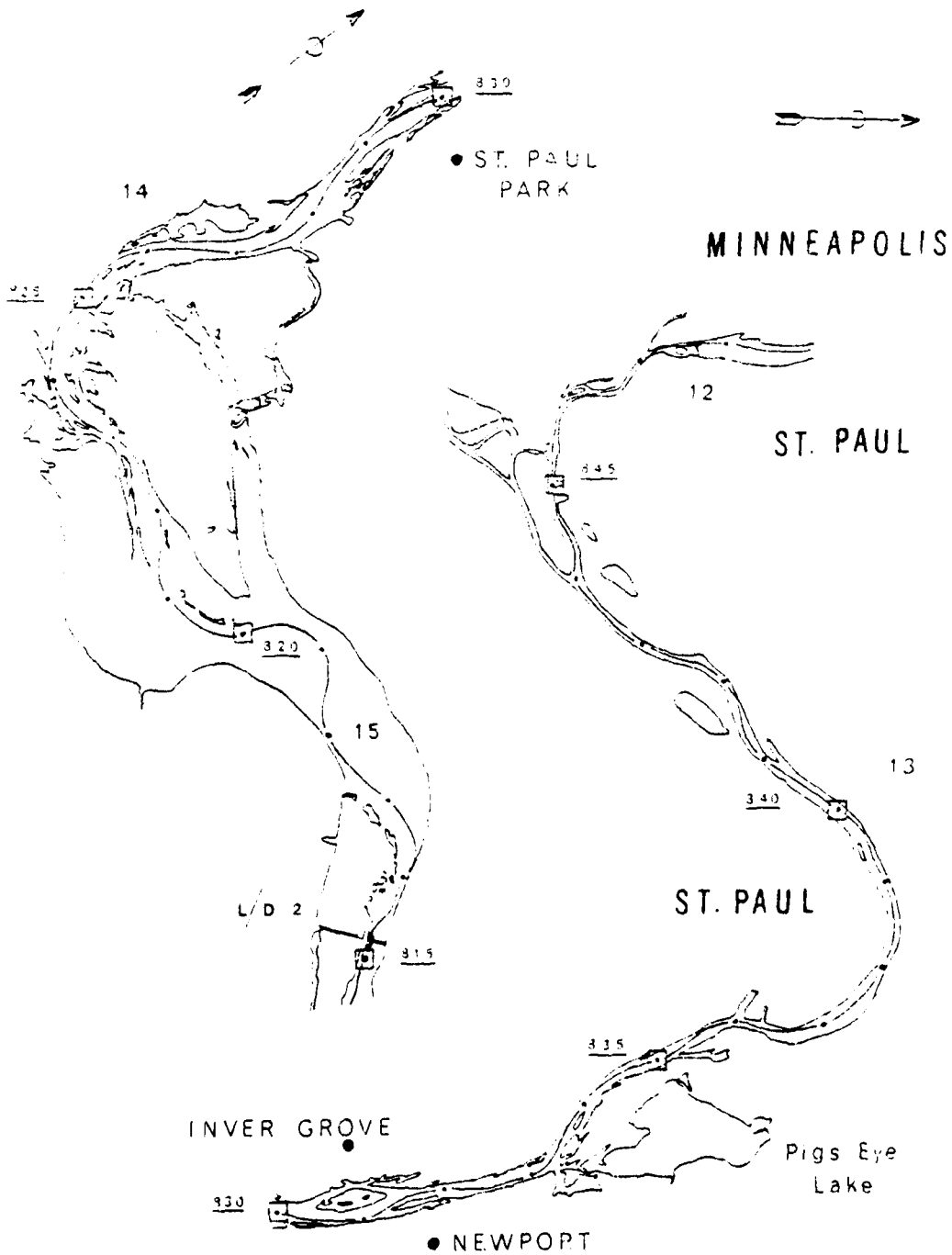


Exhibit 199

St. Croix River Sites 4-7

Upper Mississippi River Sites 16-25

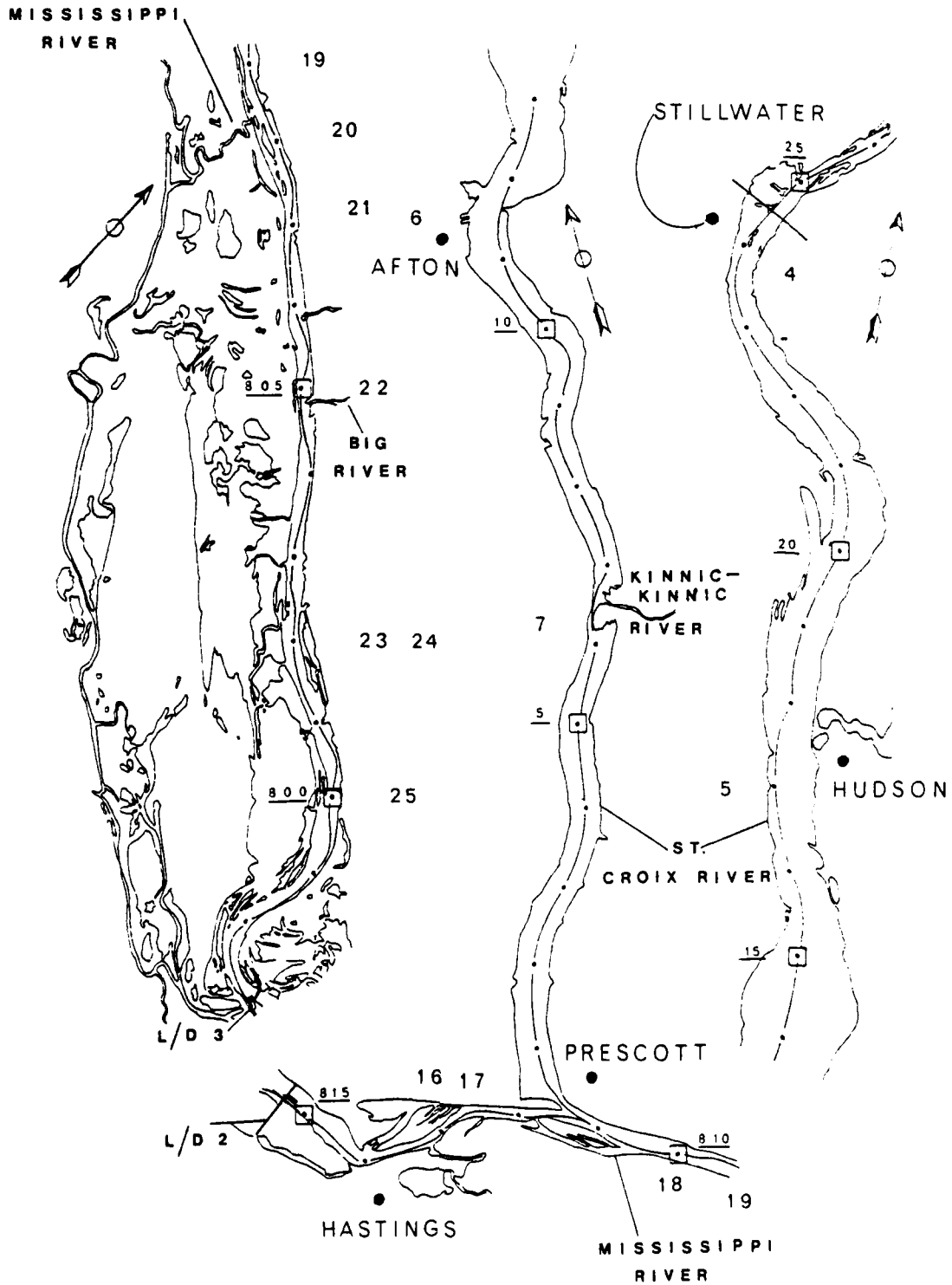


Exhibit 200

Upper Mississippi River Sites 26-34

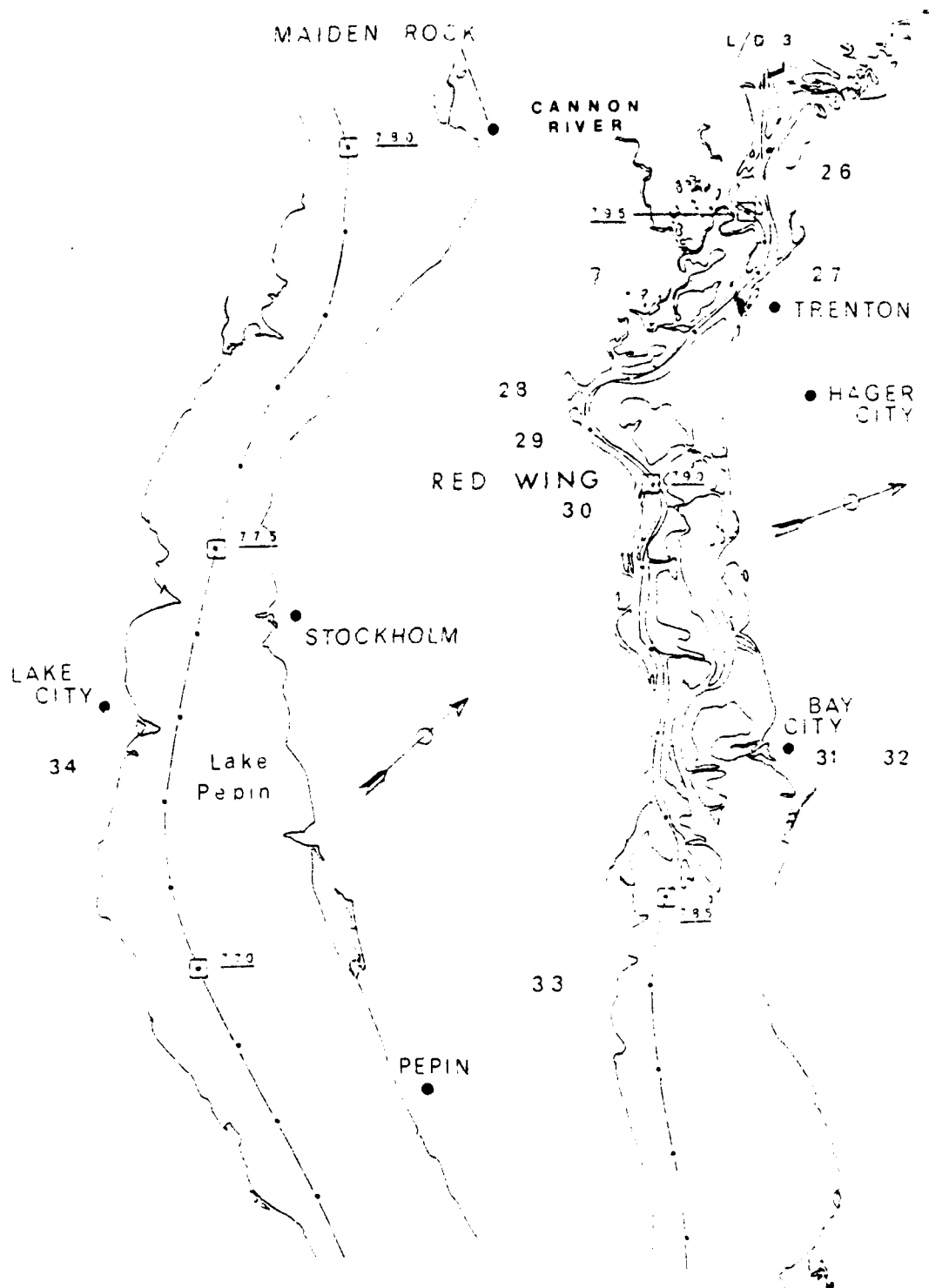
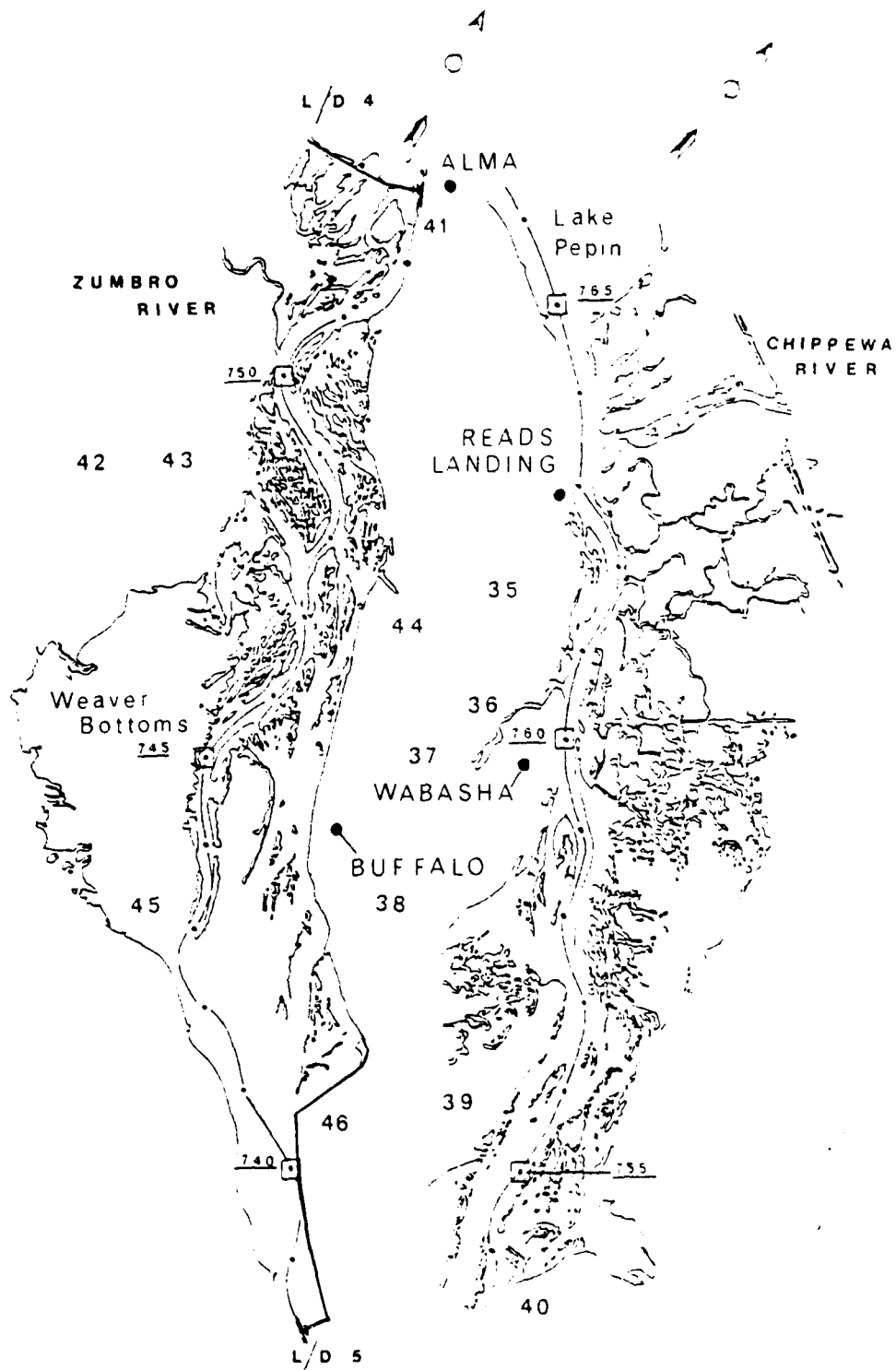


Exhibit 201

Upper Mississippi River Sites 35-46



# Upper Mississippi River sites 17-01

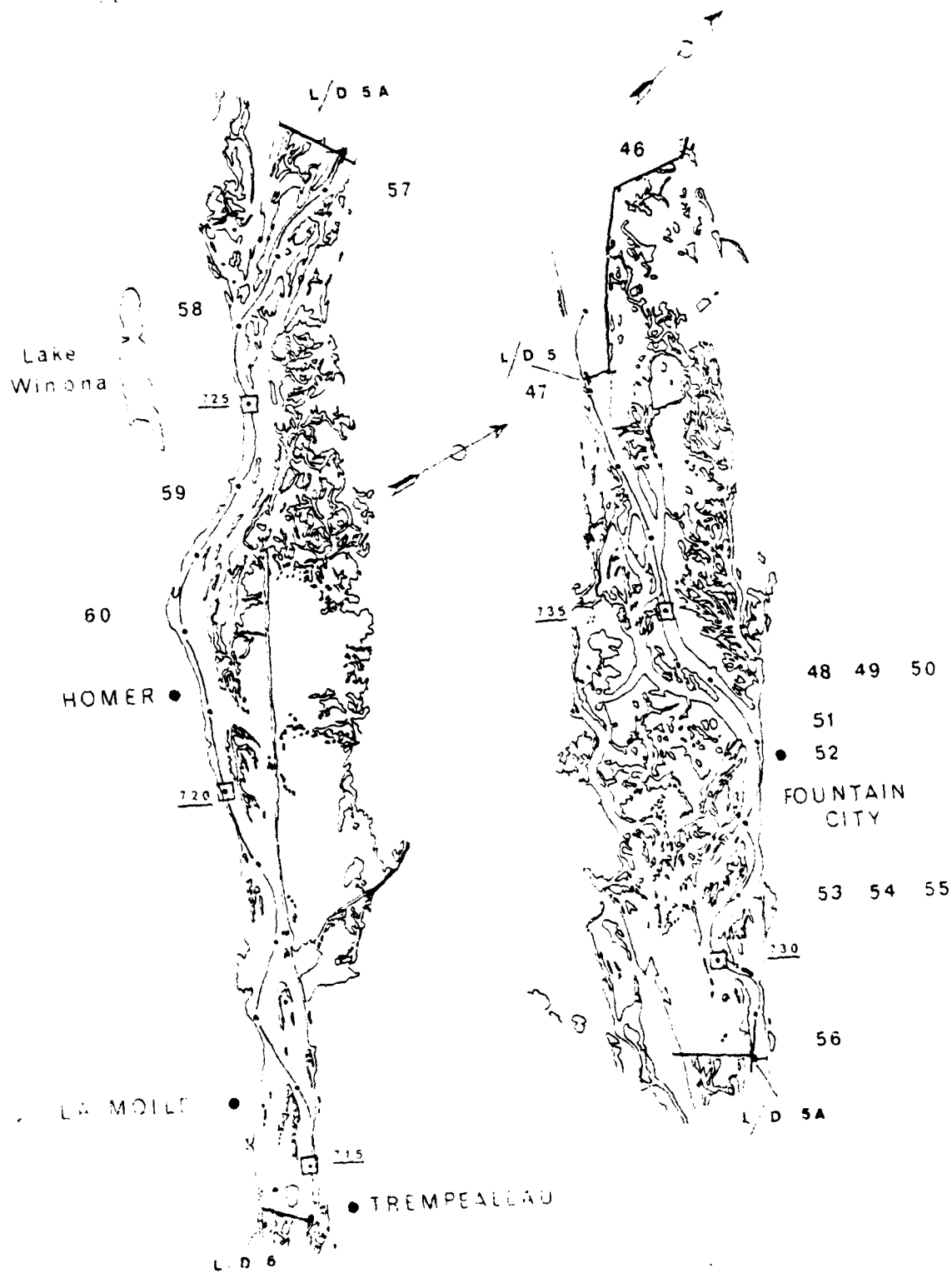


Exhibit 203

Upper Mississippi River Sites 61-64

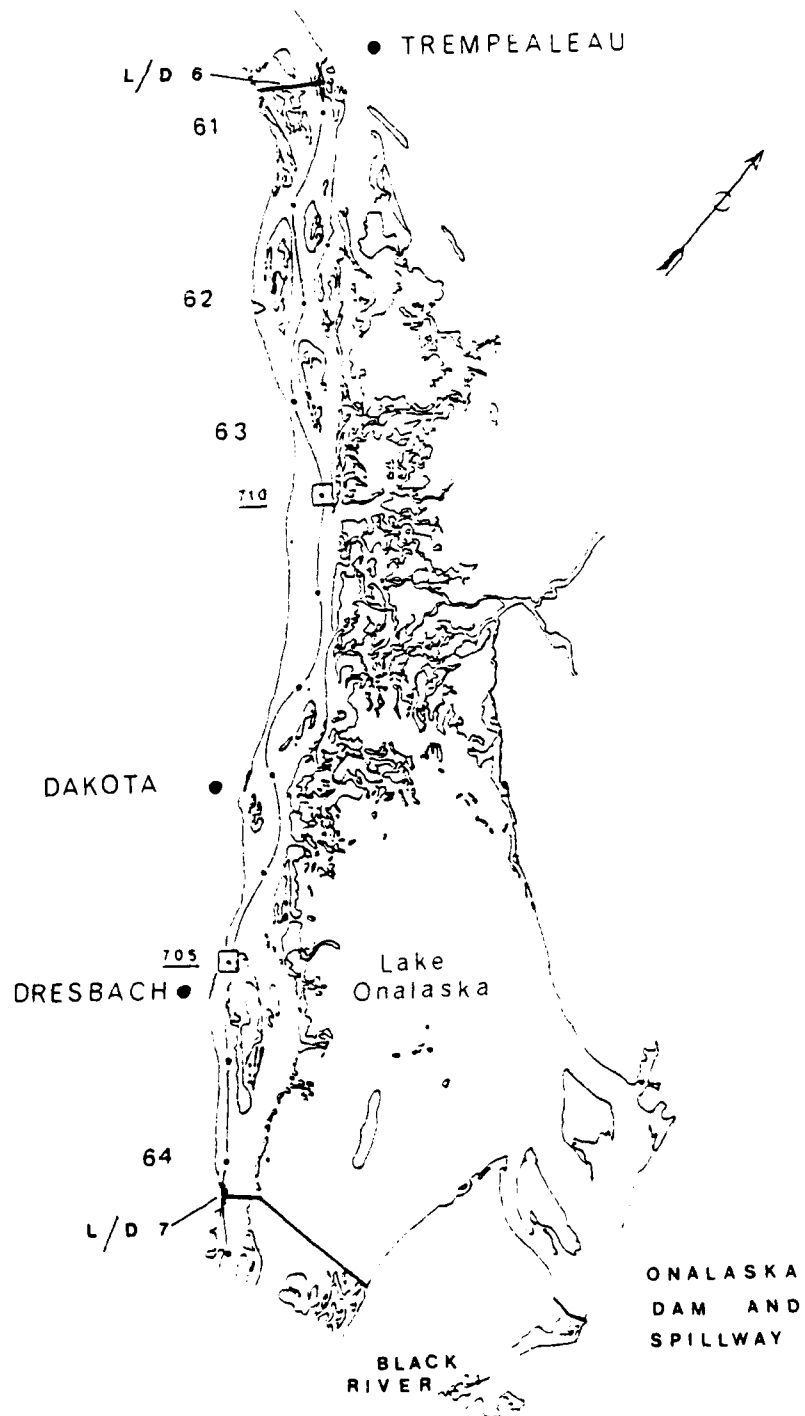




Exhibit 31

Upper Mississippi River Lines 65-74

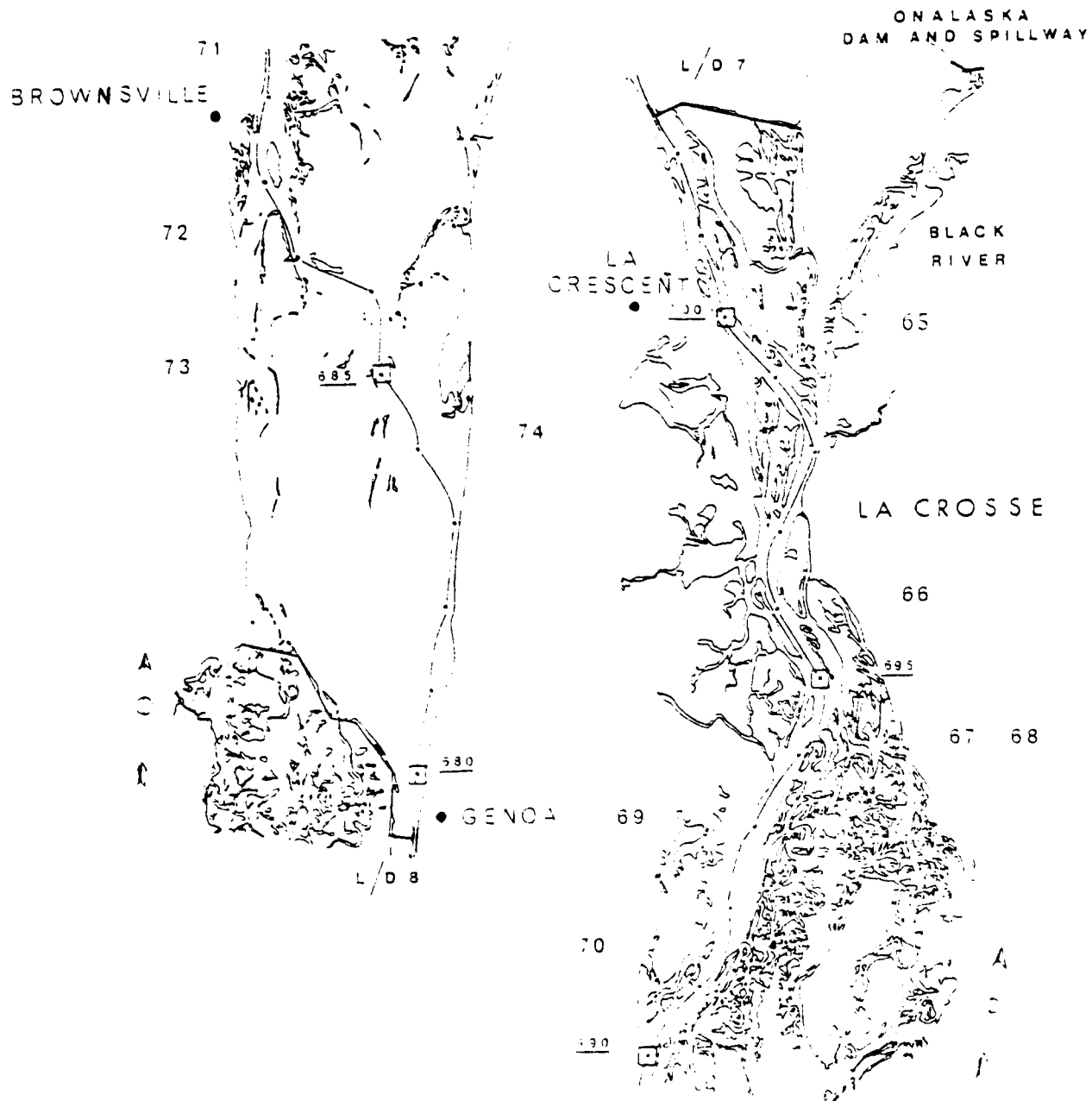


Exhibit 205

Upper Mississippi River Sites 77-89

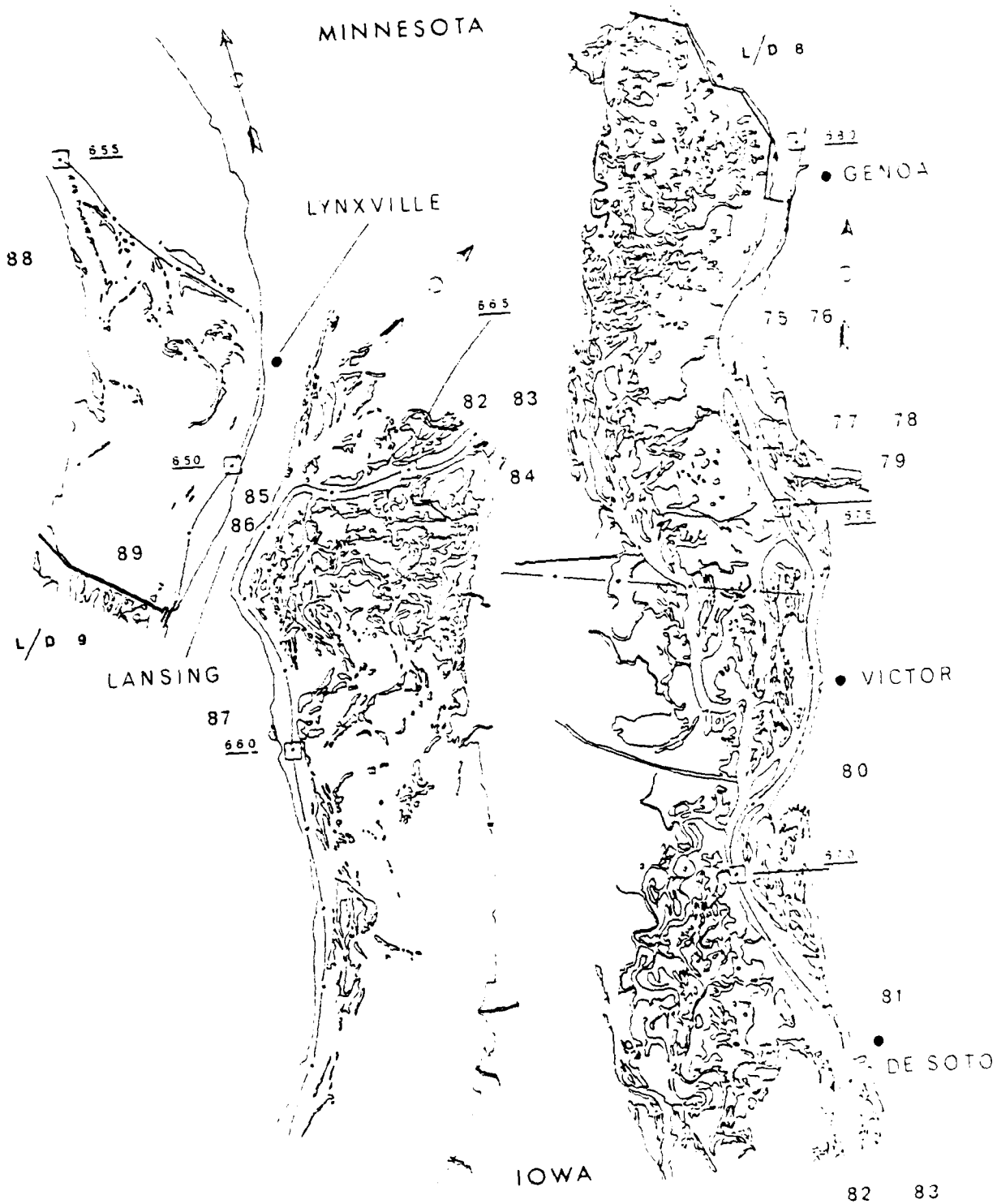
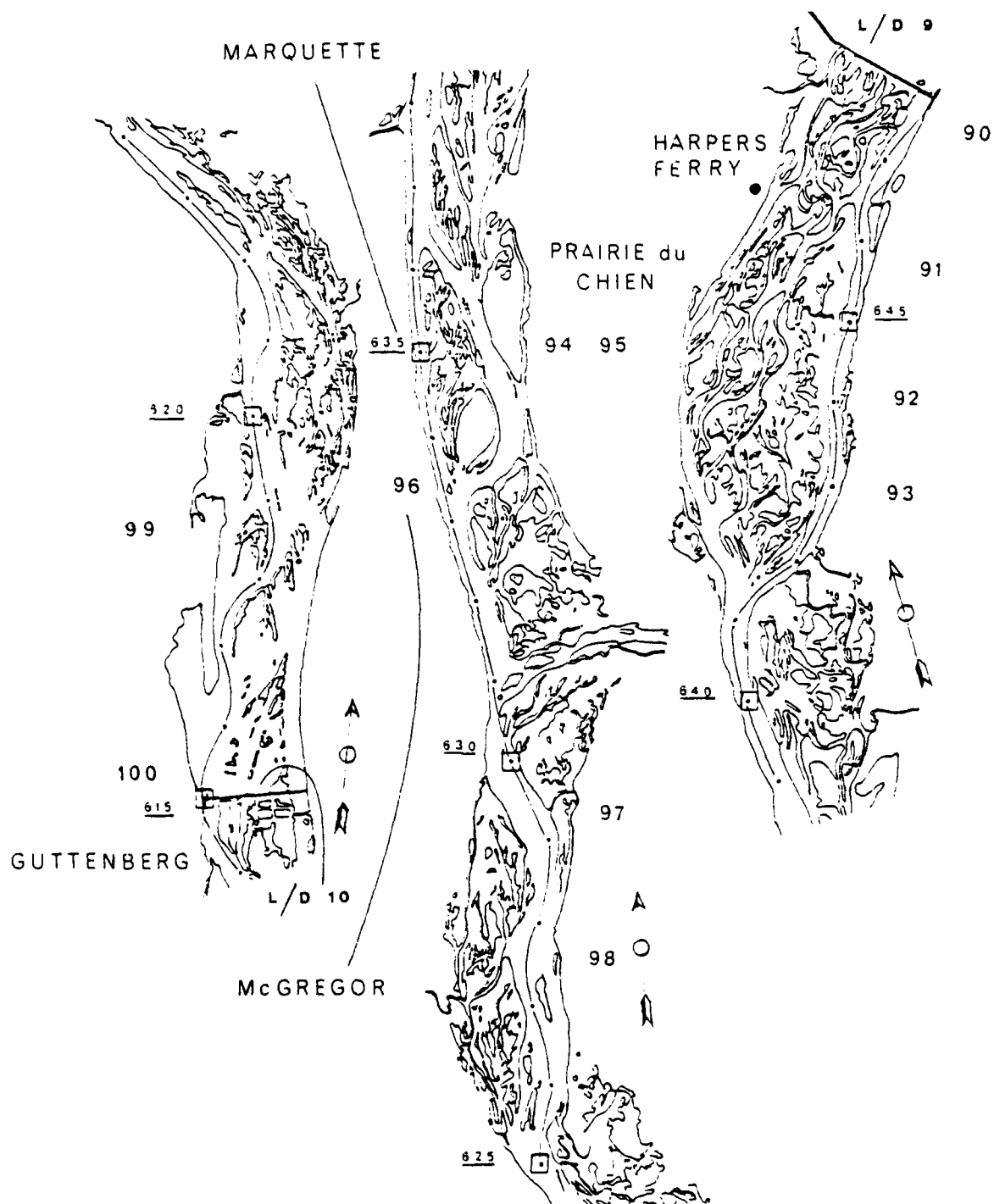


Exhibit 206

Upper Mississippi River Sites 90-100



## Exhibits 207-251

### Sites

In the following 45 Exhibits the 100 Sites surveyed during this project are depicted on the same scale as is used on the Corps navigation charts (USACE, 1975).

The upper and lower limits of a Site are represented by dark bars across the navigation channel and its borders (in some cases the entire breadth of the river is included). Each Site is given the same number used for it in Exhibits 196 through 206.

Approximate areas of mussel beds brailed by the Academy during the study period are indicated. For the purposes of this report, mussel "beds" are those few populations that, in the Principal Investigator's opinion, were substantially more species- and individual-rich than all other study area populations. This subjective criterion is used in the absence of preferable alternatives (see Brice and Lewis, 1979; Krumholz et al., 1970; Cvanacara, 1972). Because of temporal constraints, diving in order to verify the limits and densities of beds was not conducted. Consequently, neither size- nor age-class structure is known for any of them. However, the comparative representations of the species in each can be approximately inferred from data in Appendix C. Beds occurred at only four formal study Sites in the St. Paul District: Hudson Railroad Bridge (St. Croix River), Hay Point Bank Repair, Prairie du Chien East Channel, and McGregor (all three in Pool 10); the relevant Appendix C data are in Exhibits 94, 185, 188, and 190, respectively. One other bed in the District is known to the Principal Investigator: the Whiskey Rock bed below Lansing, Iowa, in Pool 9, slightly outside the nearest Site (see Exhibit 243). According to commercial clammers, there are others, but only in Pools 9 and 10 (personal communications).

The portrayals of mussel beds necessarily are approximate (and in some instances vague) because diving in order to define their peripheries was not conducted and/or because reports have not been specific on this point.

Mussel beds are indicated by asterisk(s) or dotted lines. Arrows are used to draw the reader's attention to them. Beds are shown on pages 287, 302, 310, 321, 324, and 326. Note that much of the Prairie du Chien East Channel floor is one vast mussel bed (page 326).

# Exhibit 207

1. Cargill
2. Petersons Bar
3. Route I-35W Bridge

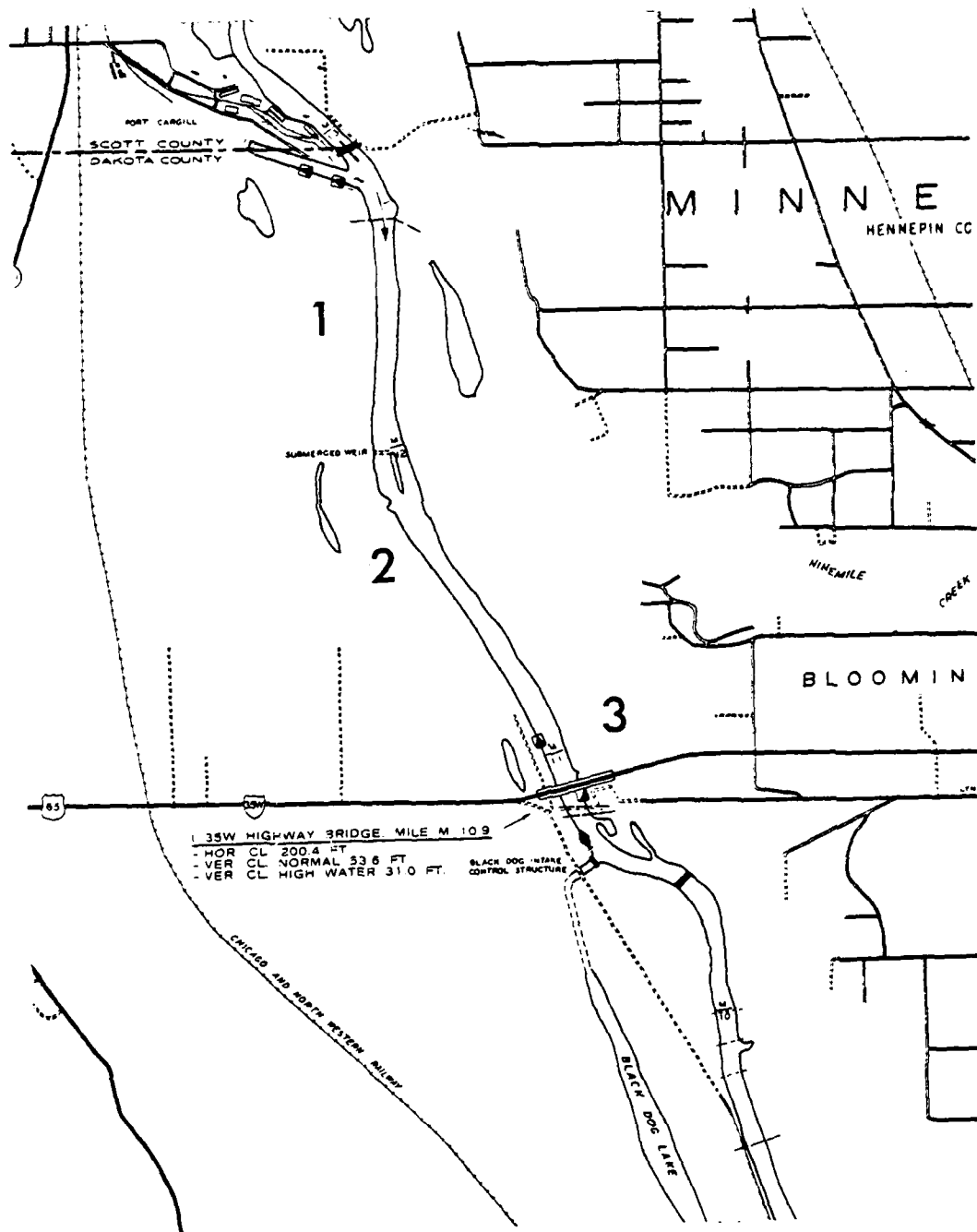


Exhibit 208

4. Stillwater

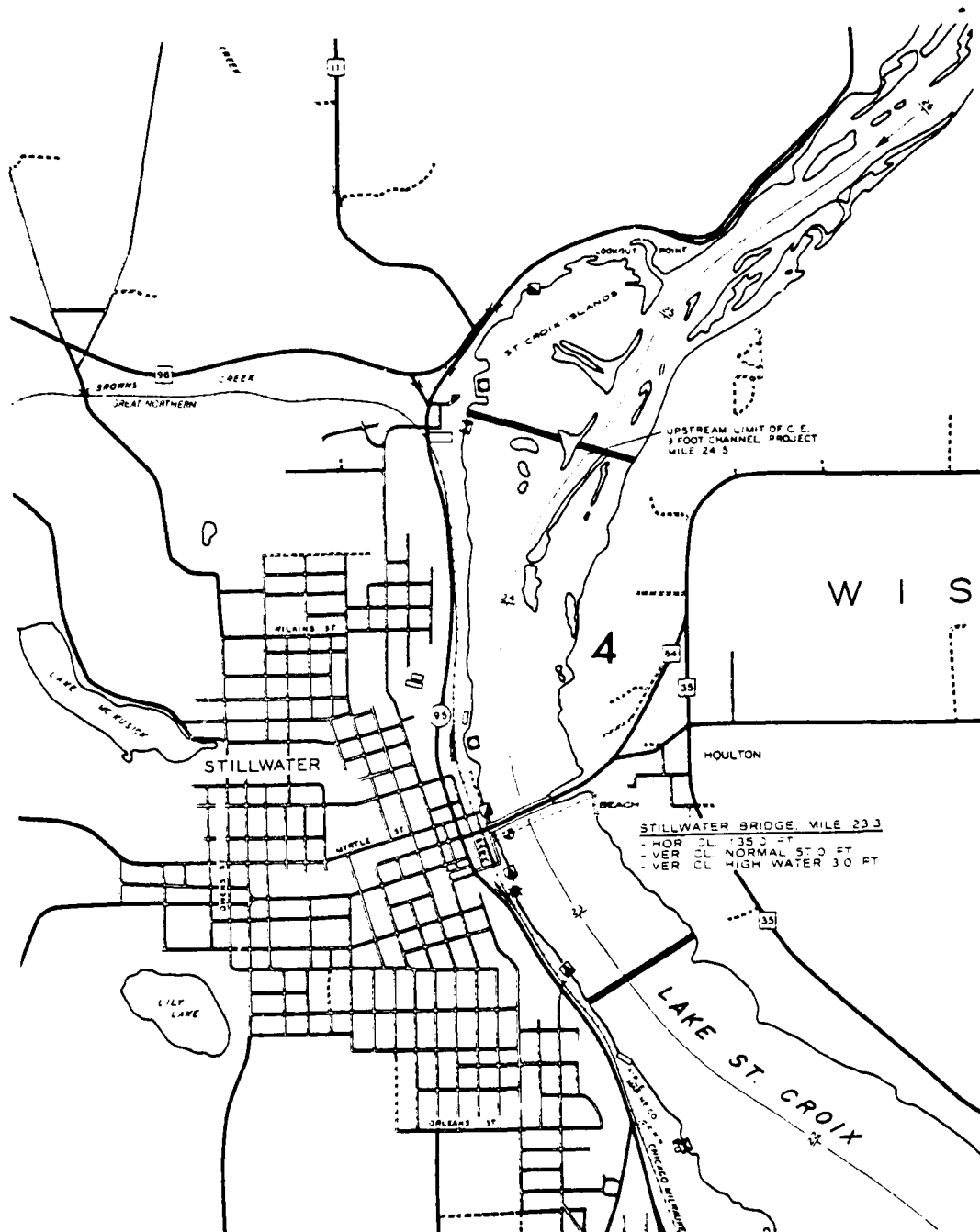


Exhibit 209

S. Hudson

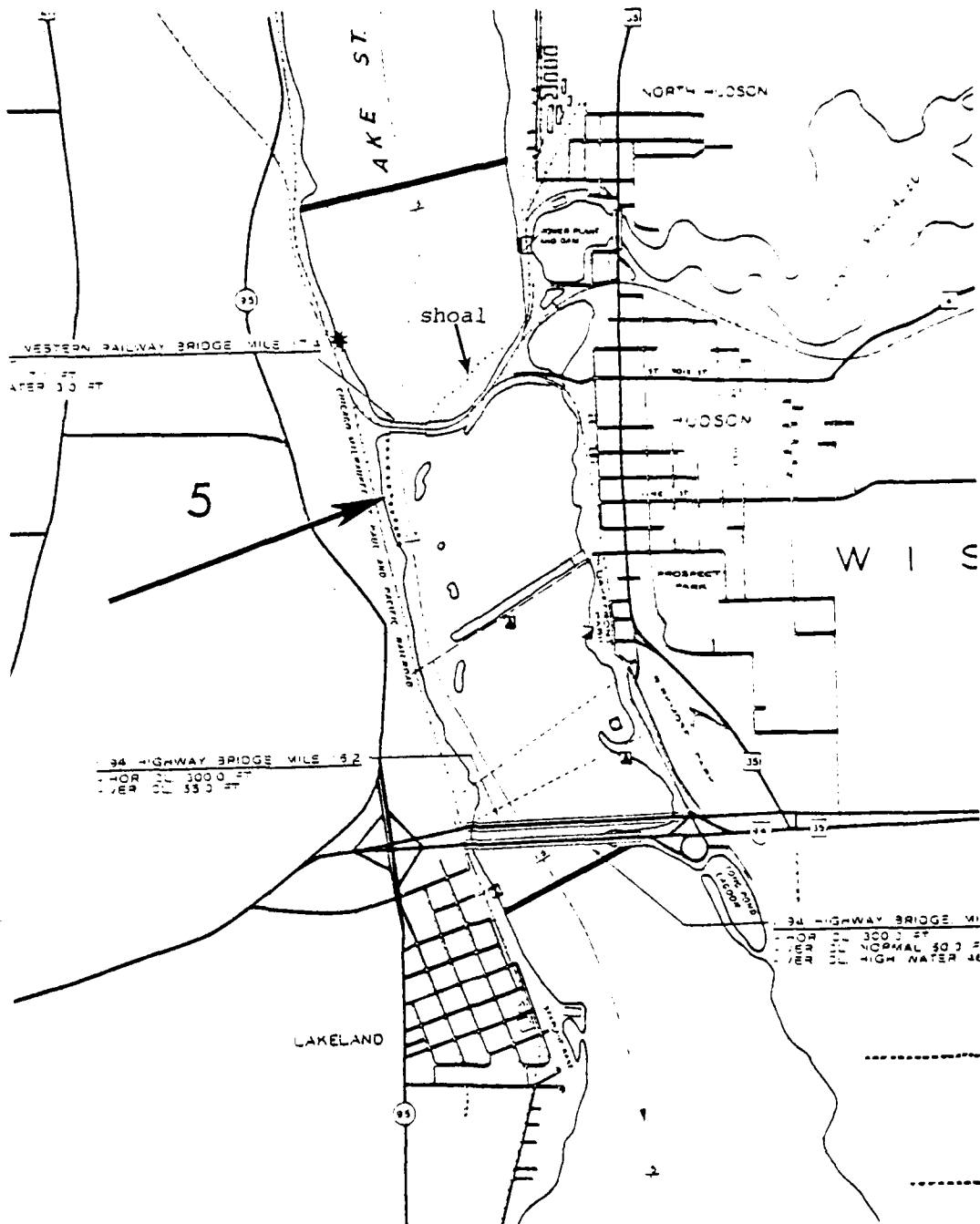


Exhibit 210  
6. Catfish Bar

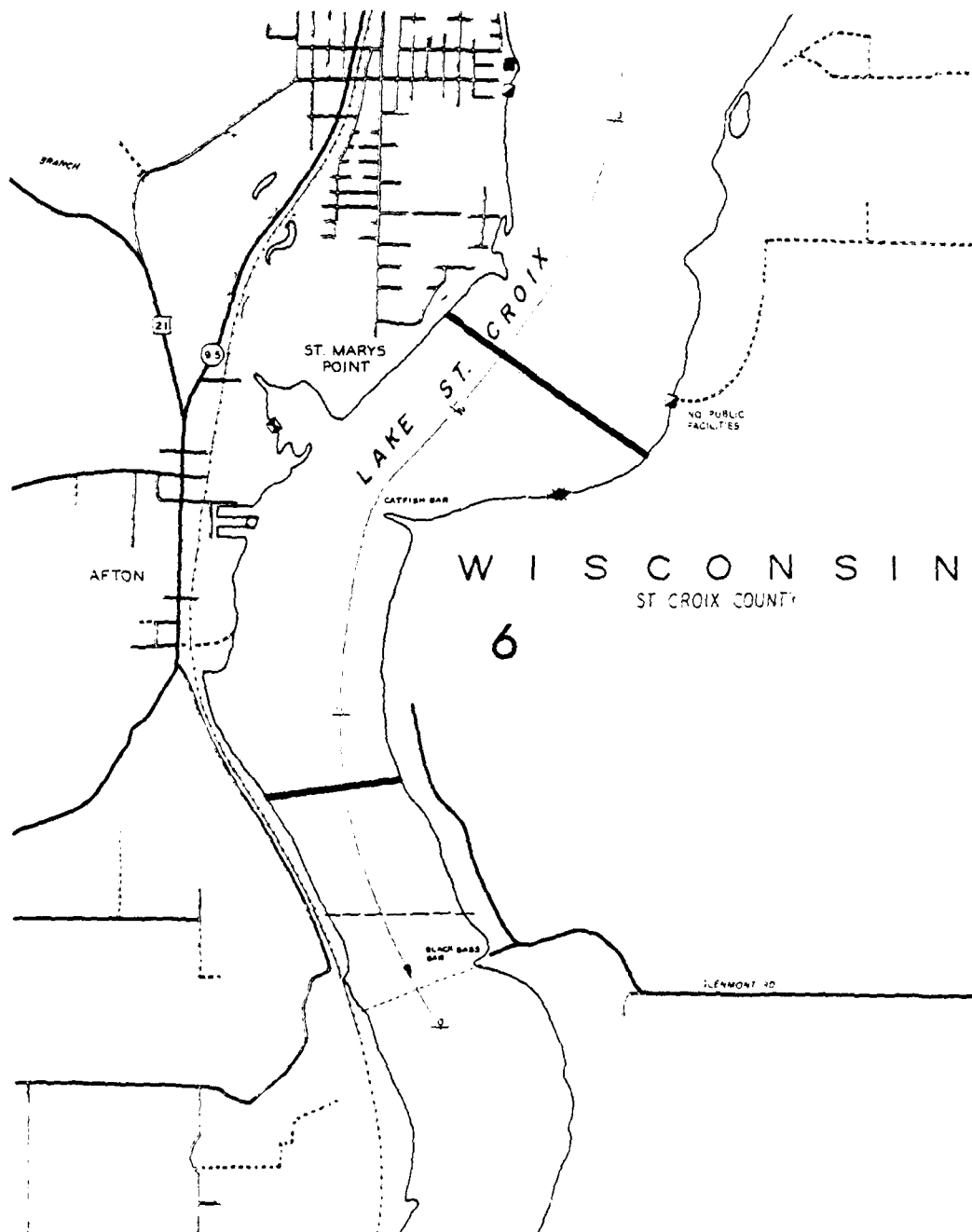
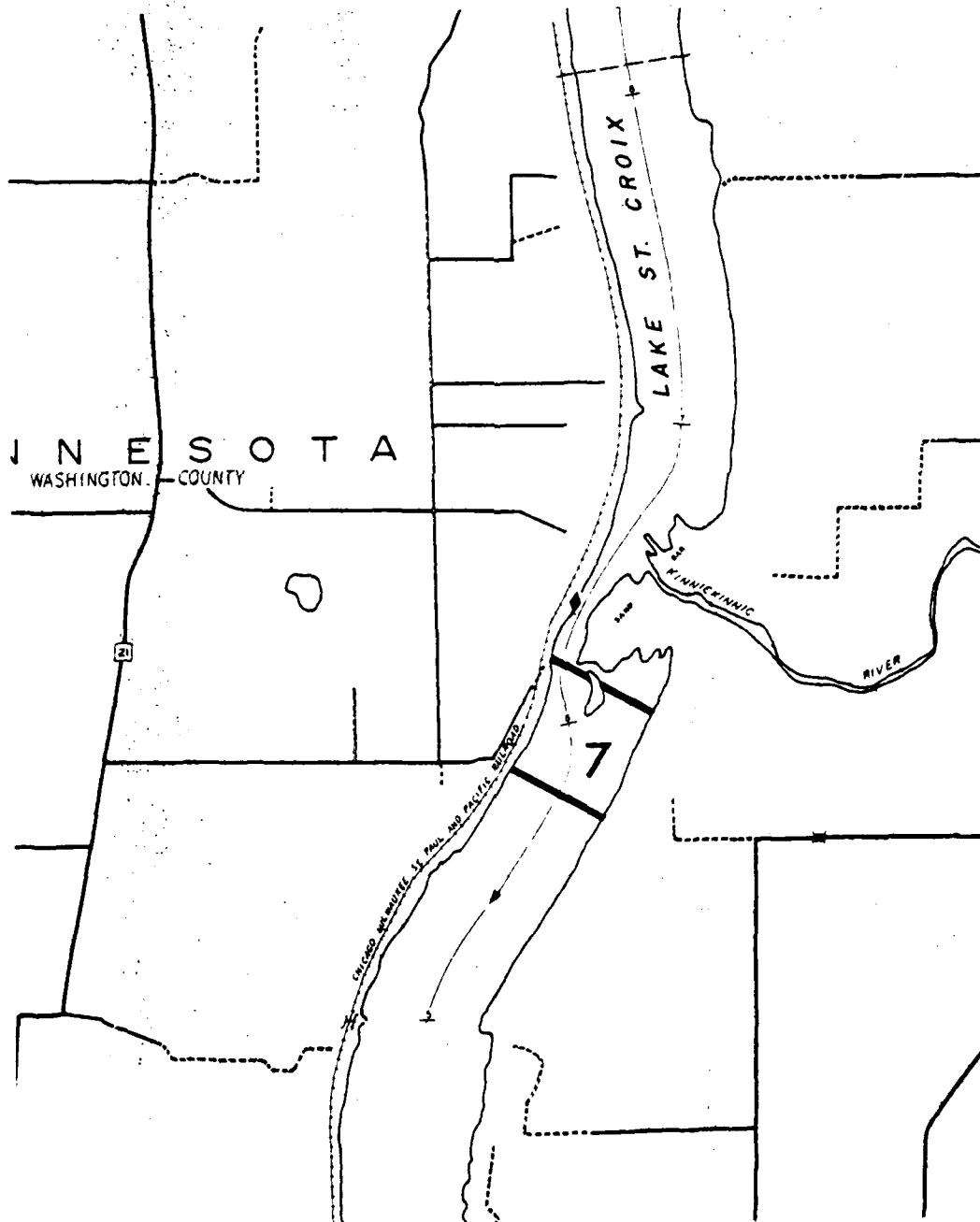




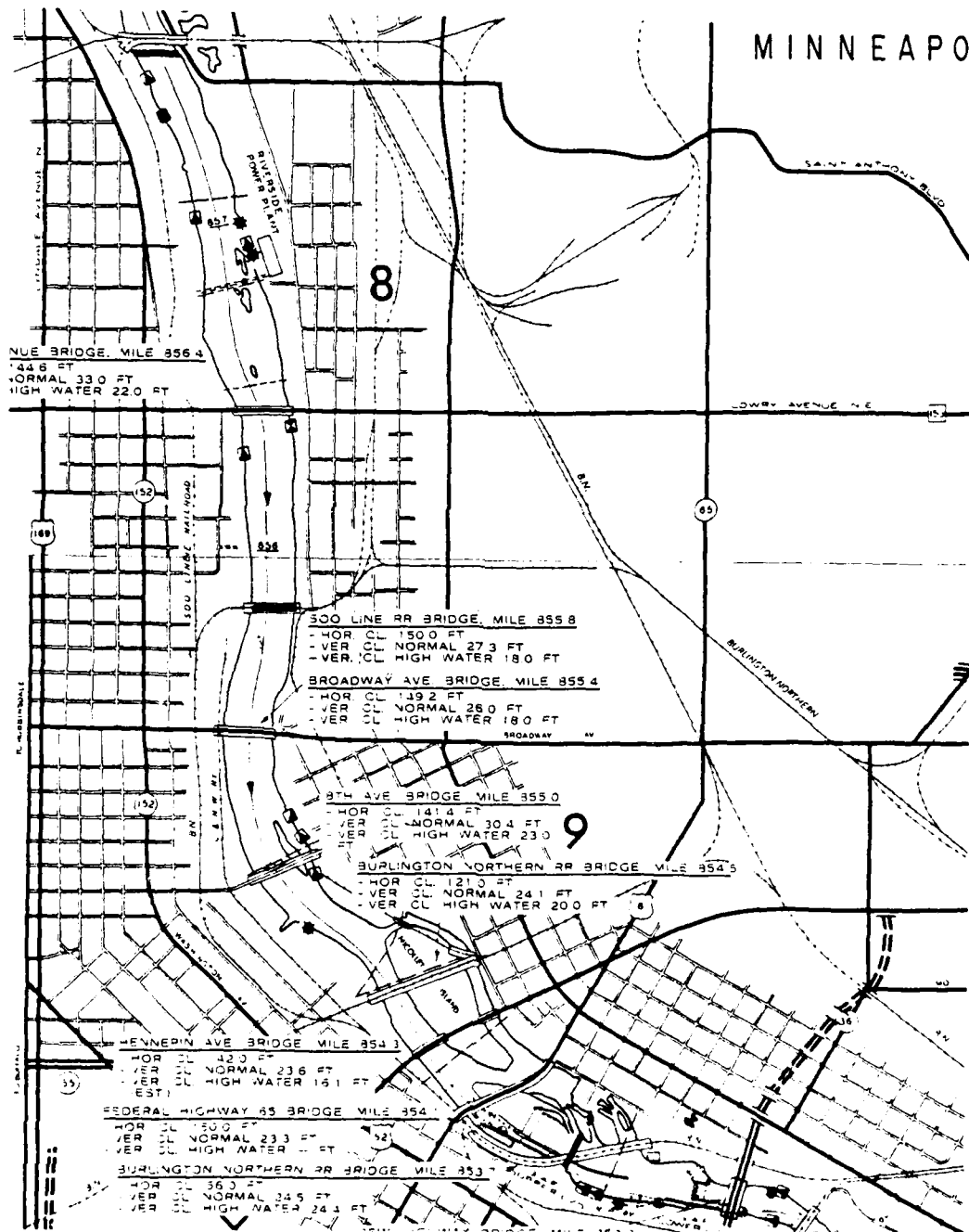
Exhibit 211

7. Kinnickinnic



# Exhibit 212

8. SOO Line Railroad Bridge
9. Broadway and Plymouth Avenues Bridges



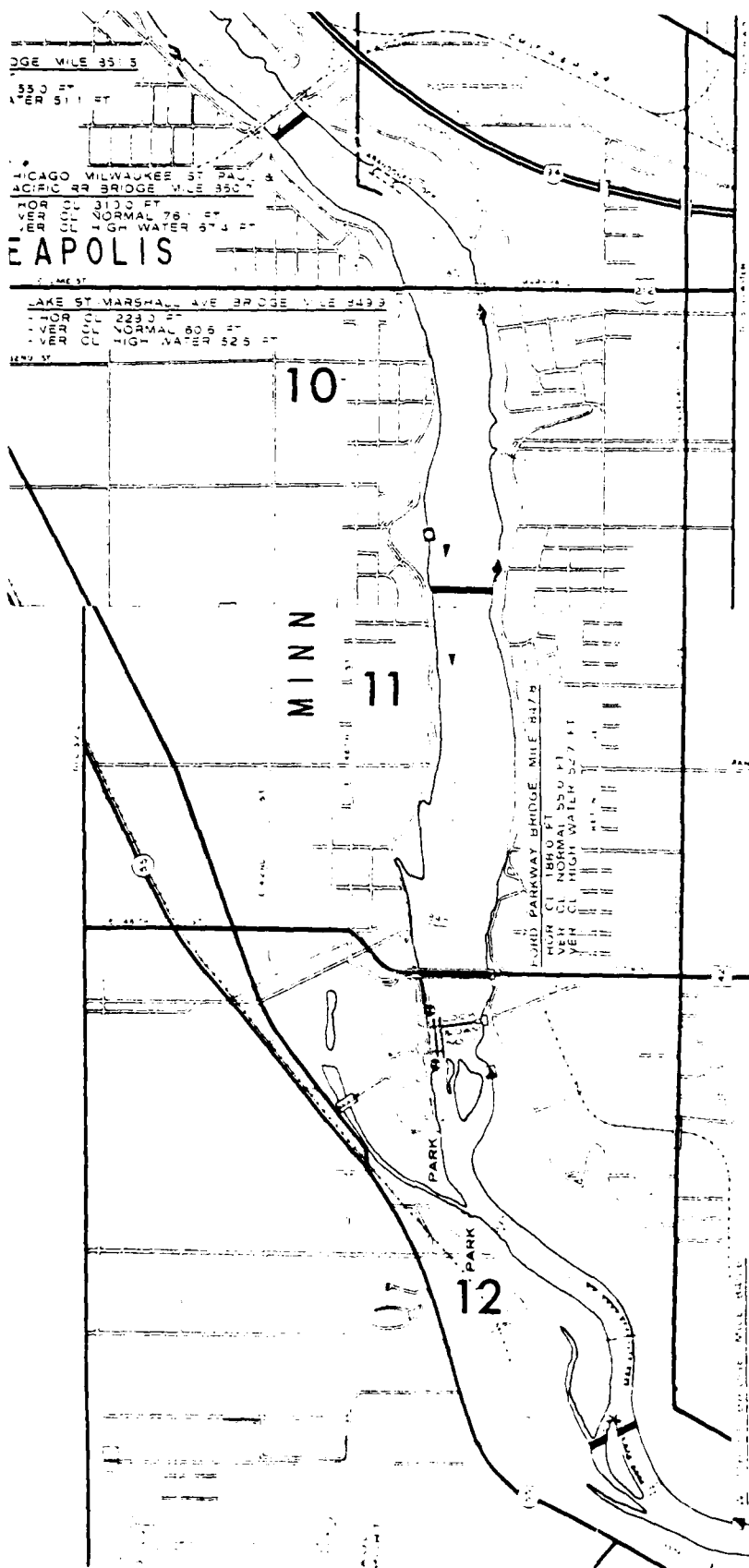


Exhibit 213

- 10. Lake Street Bridge
- 11. St. Paul Daymark 849.1
- 12. Locks and Dam 1 Upper Approach Construction (in part)

Exhibit 214

13. Smith Avenue ("High") Bridge

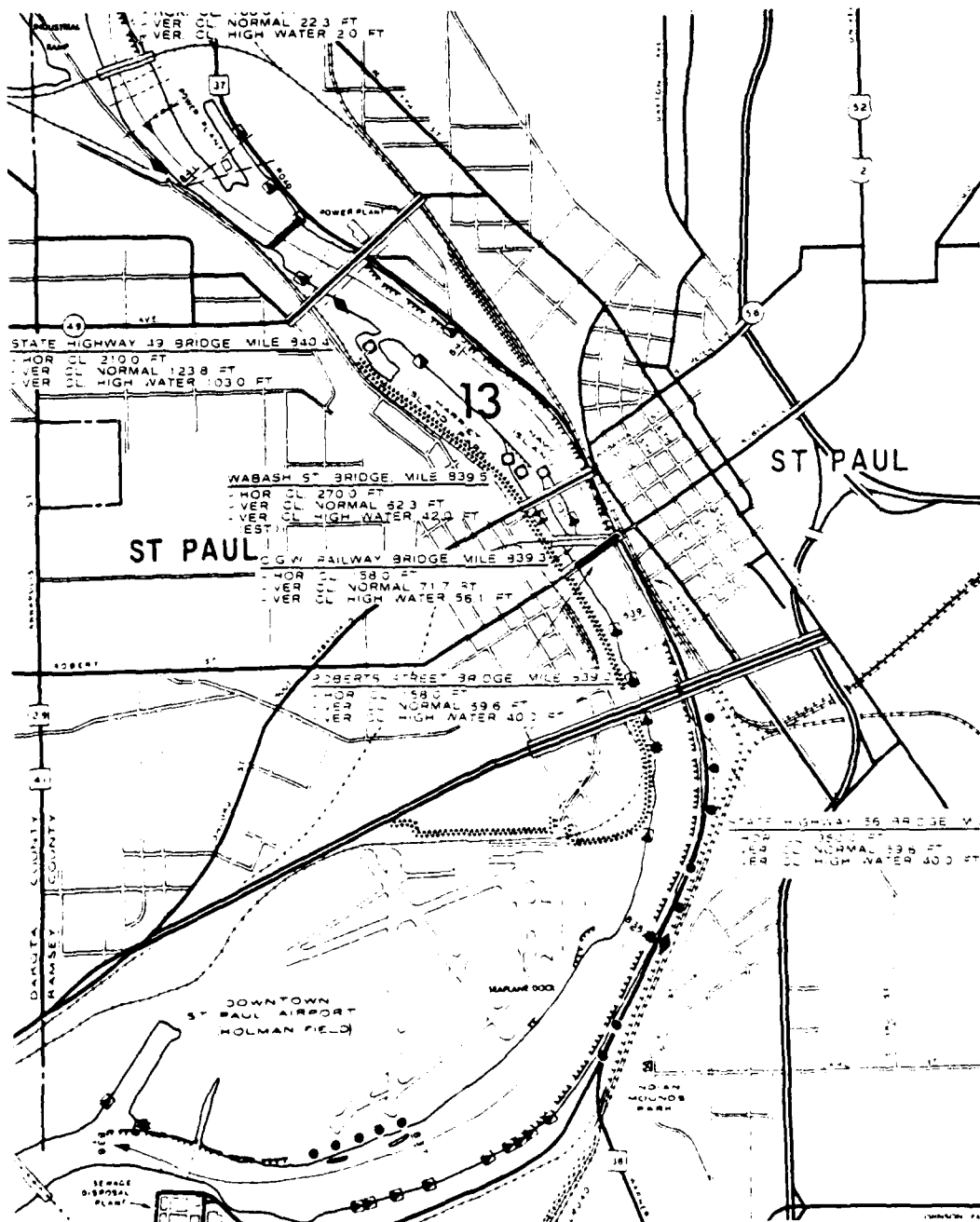
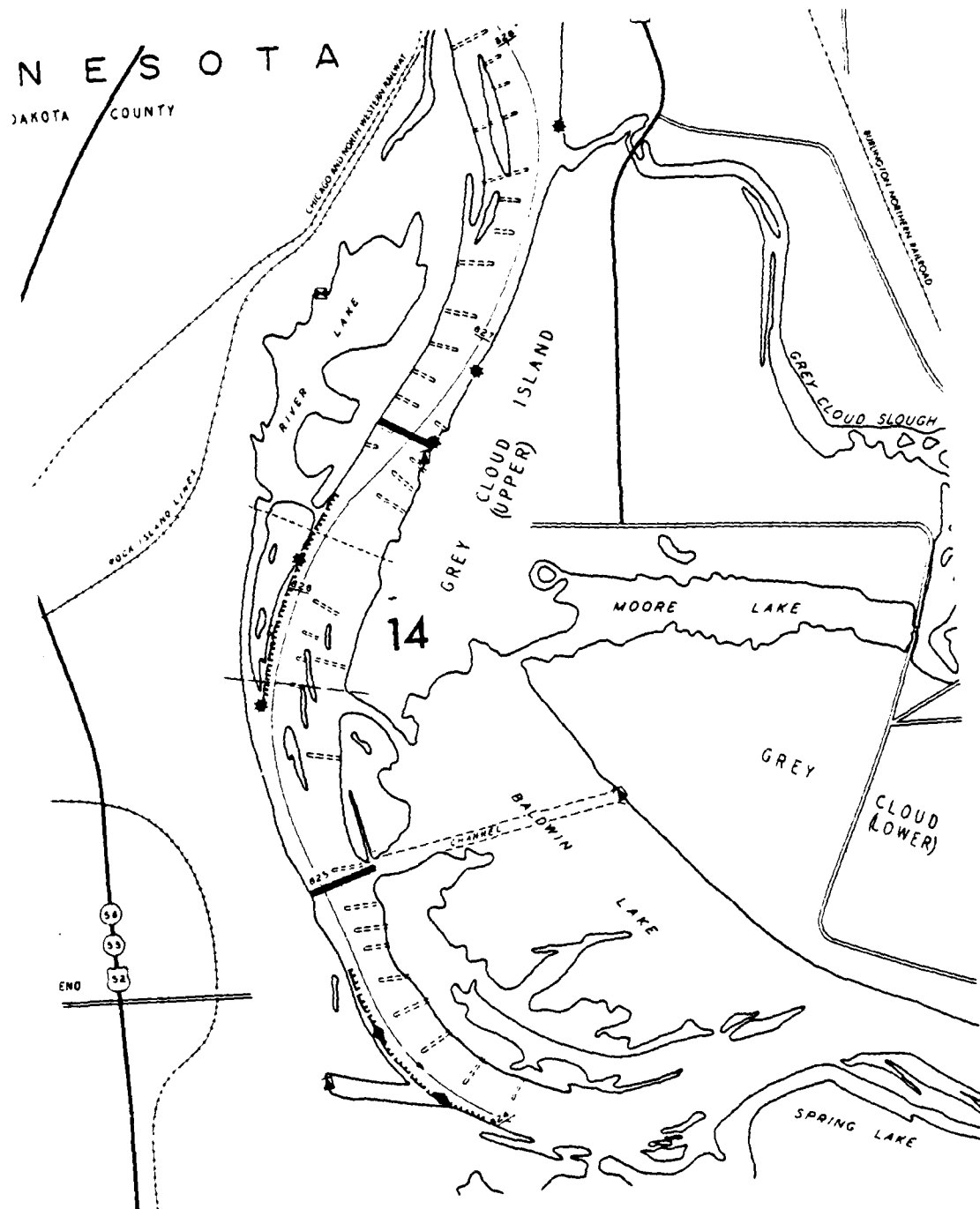


Exhibit 215  
14. Robinsons Rocks





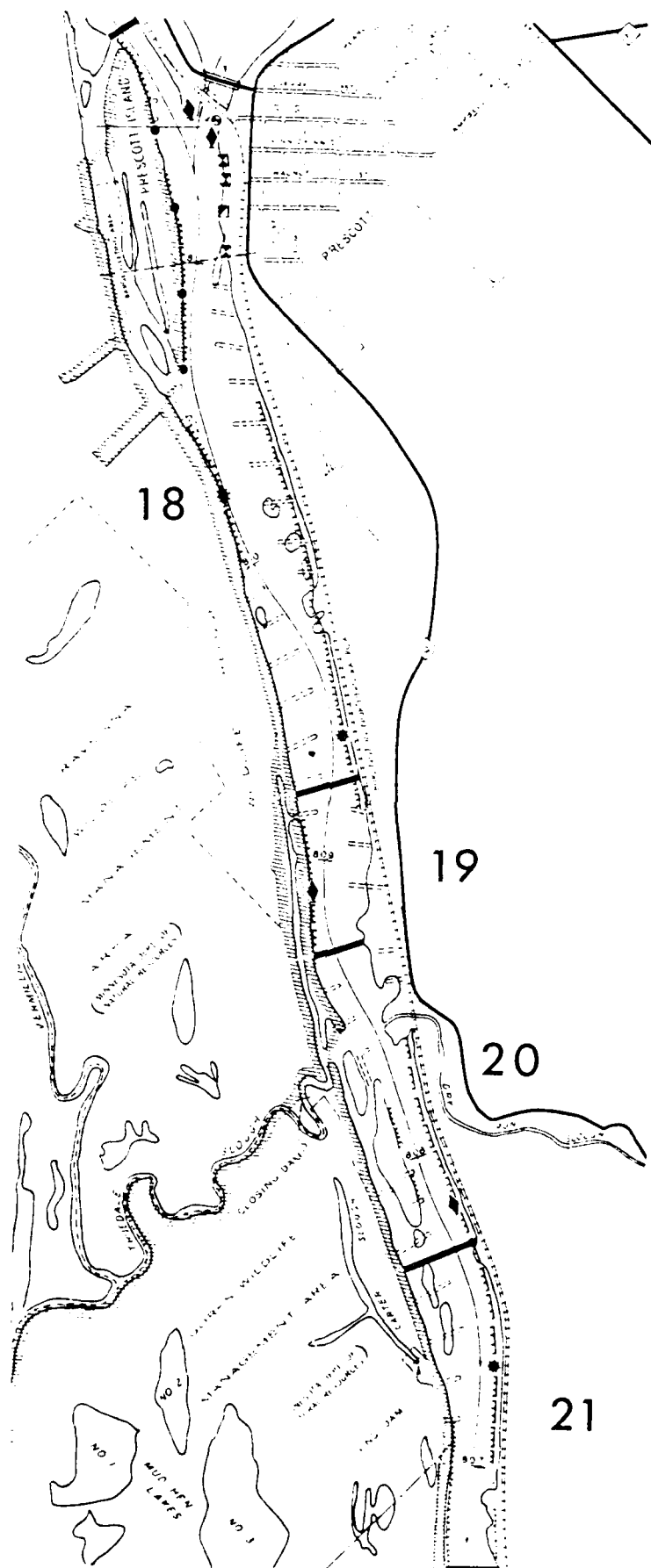
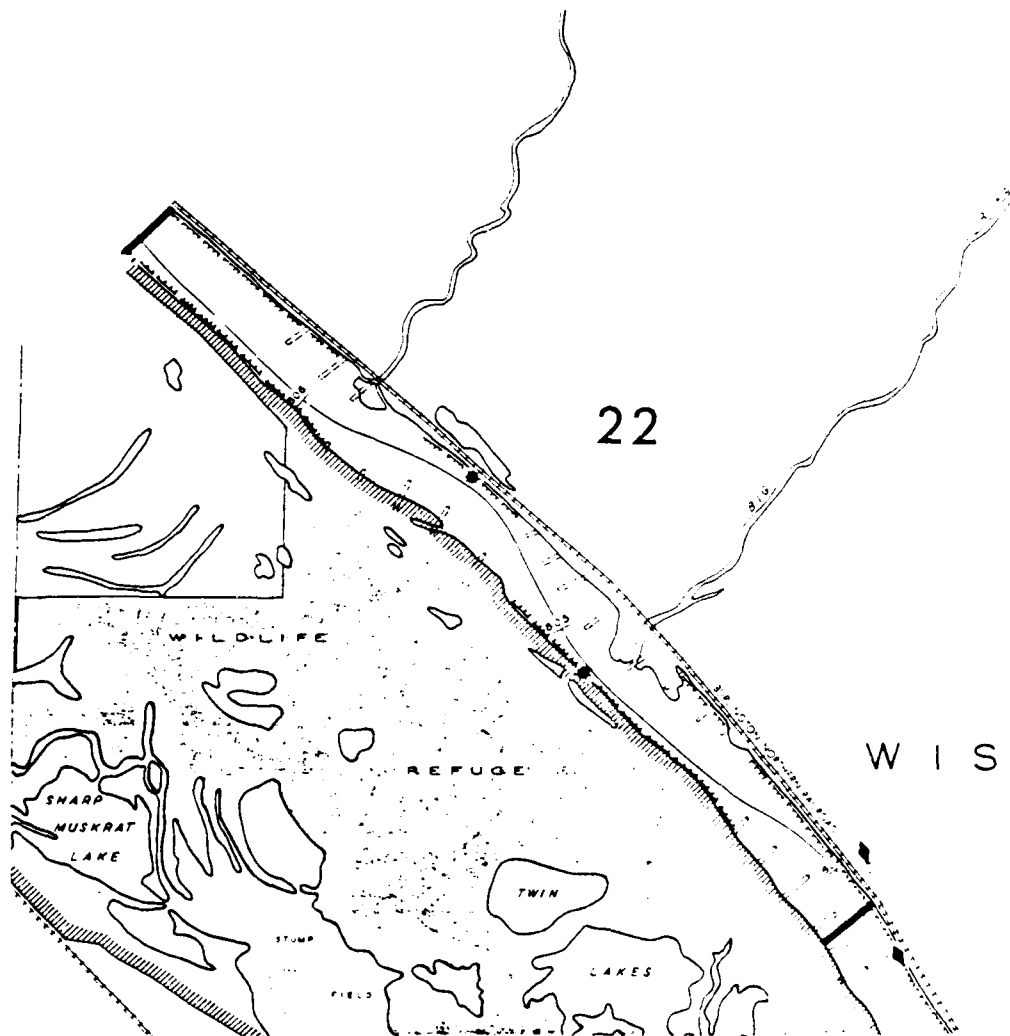


Exhibit 217

- 18. Prescott
- 19. Pine Coulee
- 20. Truedale Slough
- 21. Four Mile Island

Exhibit 218

22. Big River





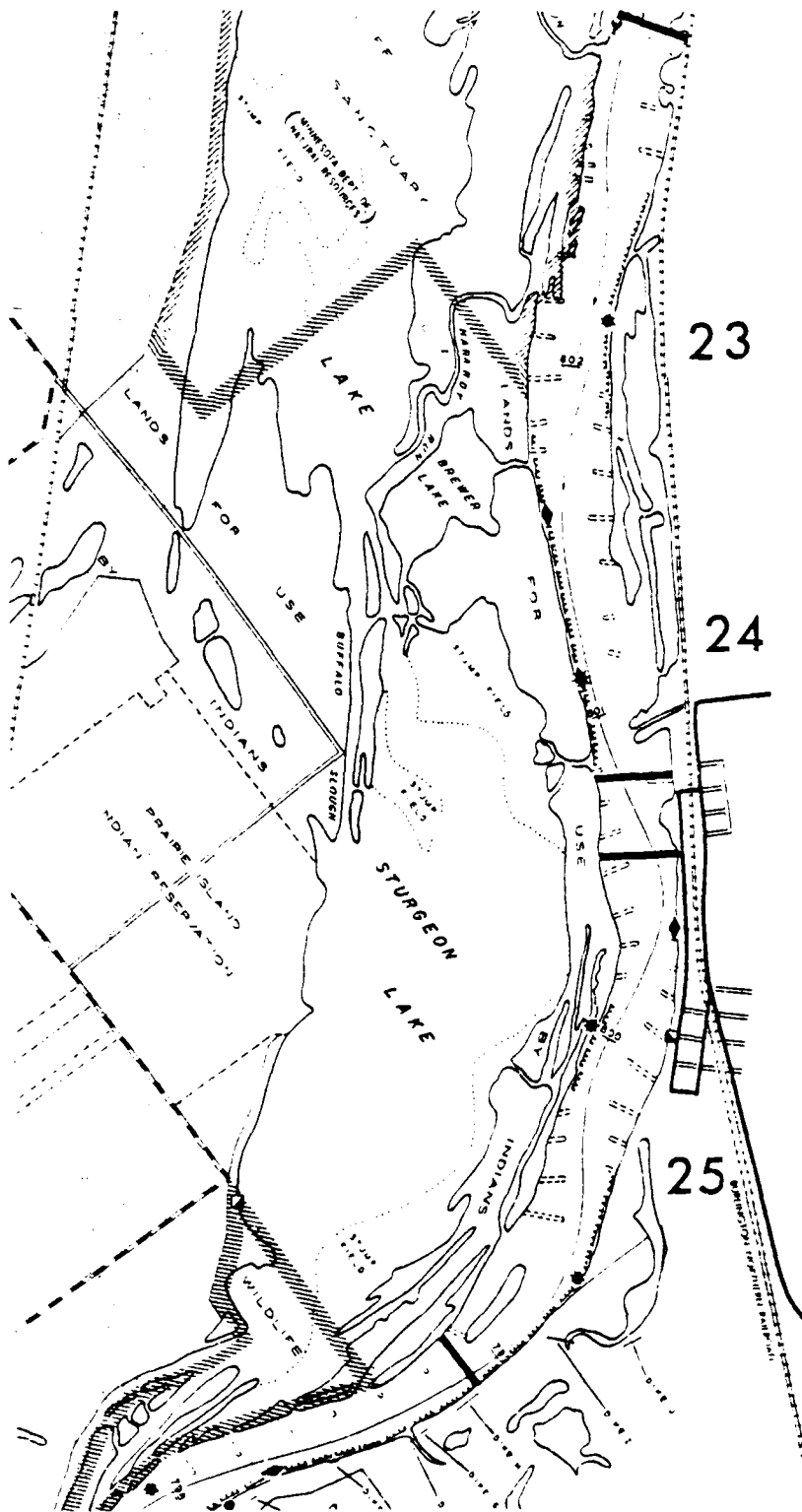


Exhibit 219

- 23. Morgan Coulee
- 24. Coulters Island
- 25. Diamond Bluff

Exhibit 220

- 26. Above Trenton
- 27. Trenton
- 28. Cannon River
- 29. Red Wing Commercial and Small Boat Harbors

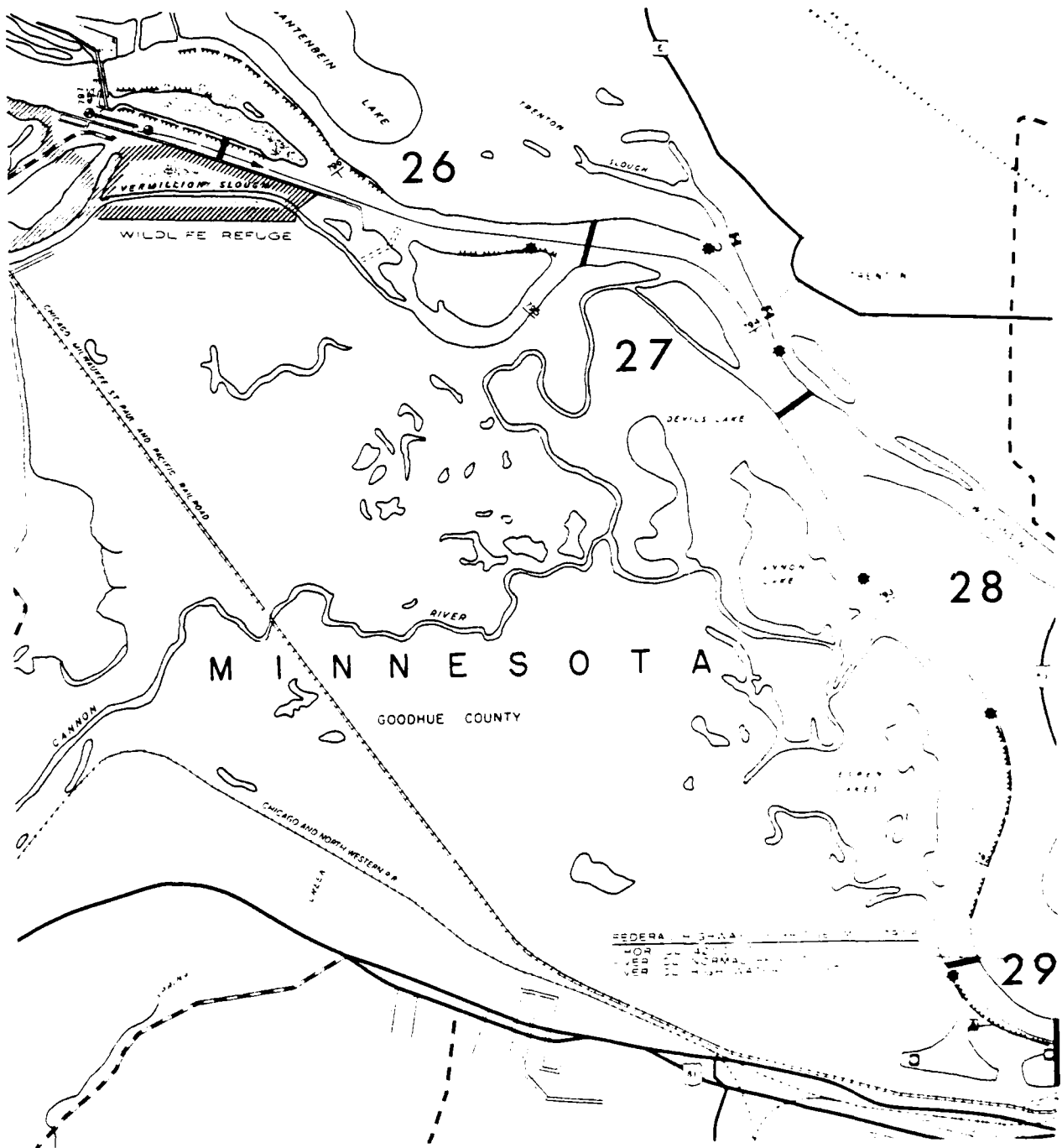


Exhibit 221

30. Red Wing Highway Bridge

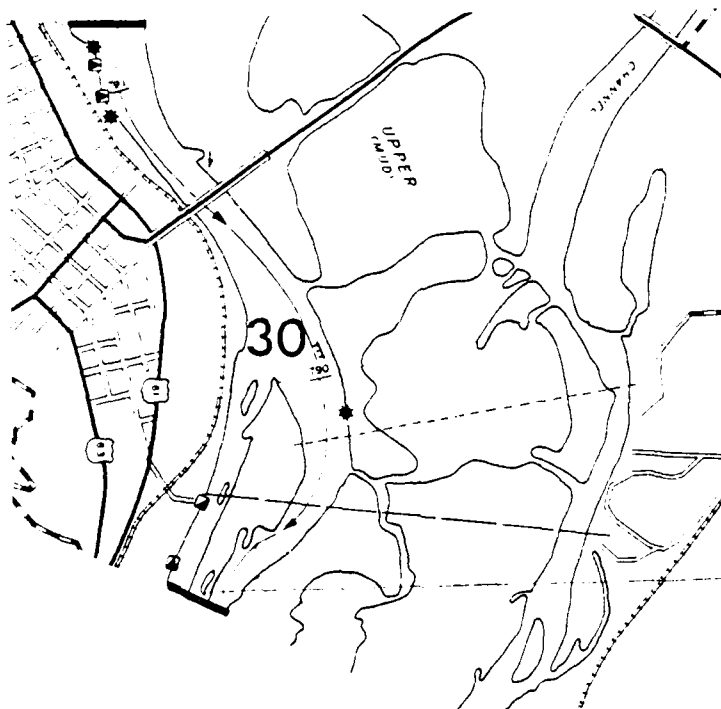


Exhibit 222

- 31. Bay City Small Boat Harbor
- 32. Bay City Commercial and Recreational Sites
- 33. Wacouta Point

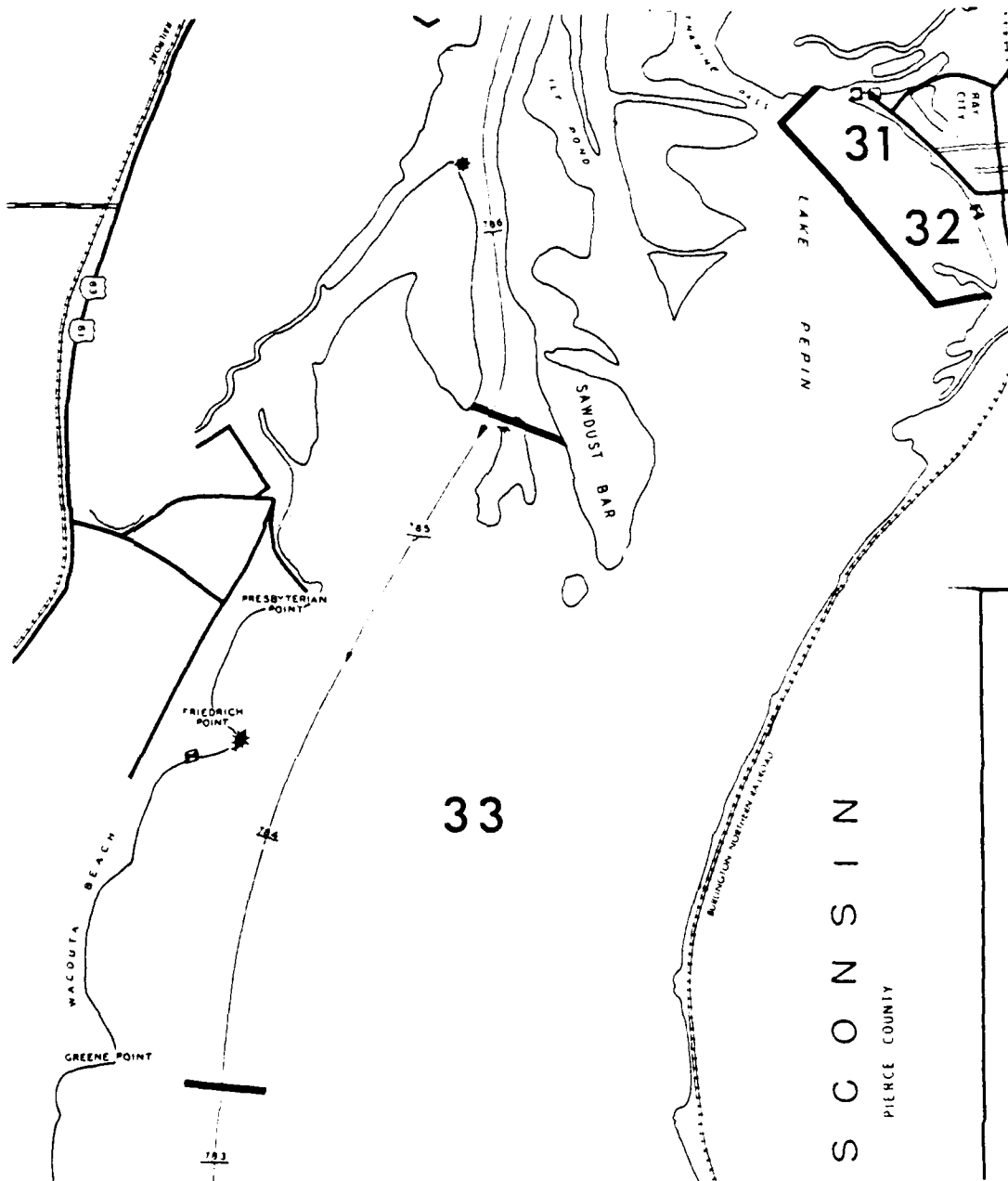
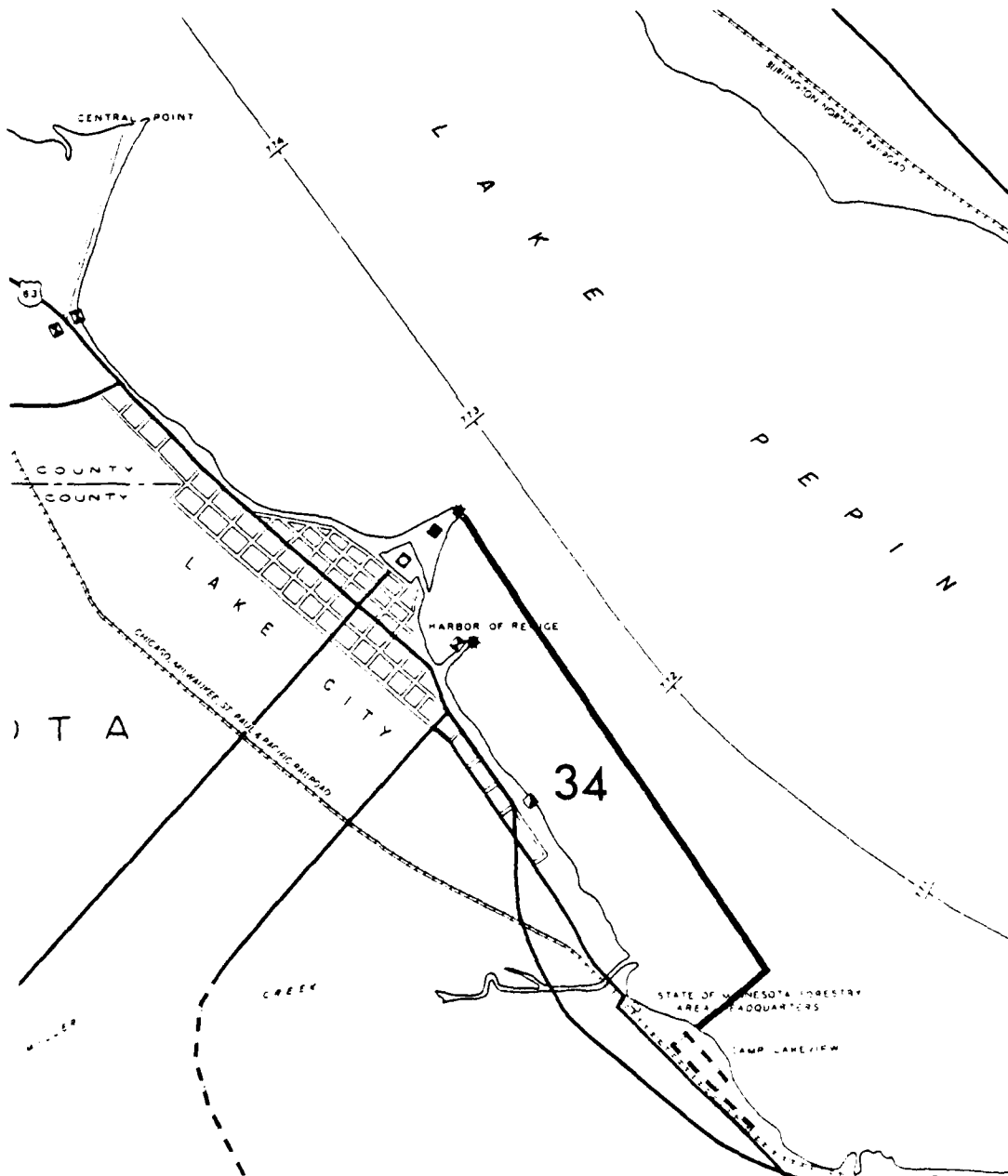


Exhibit 223

34. Lake City Small Boat Harbor



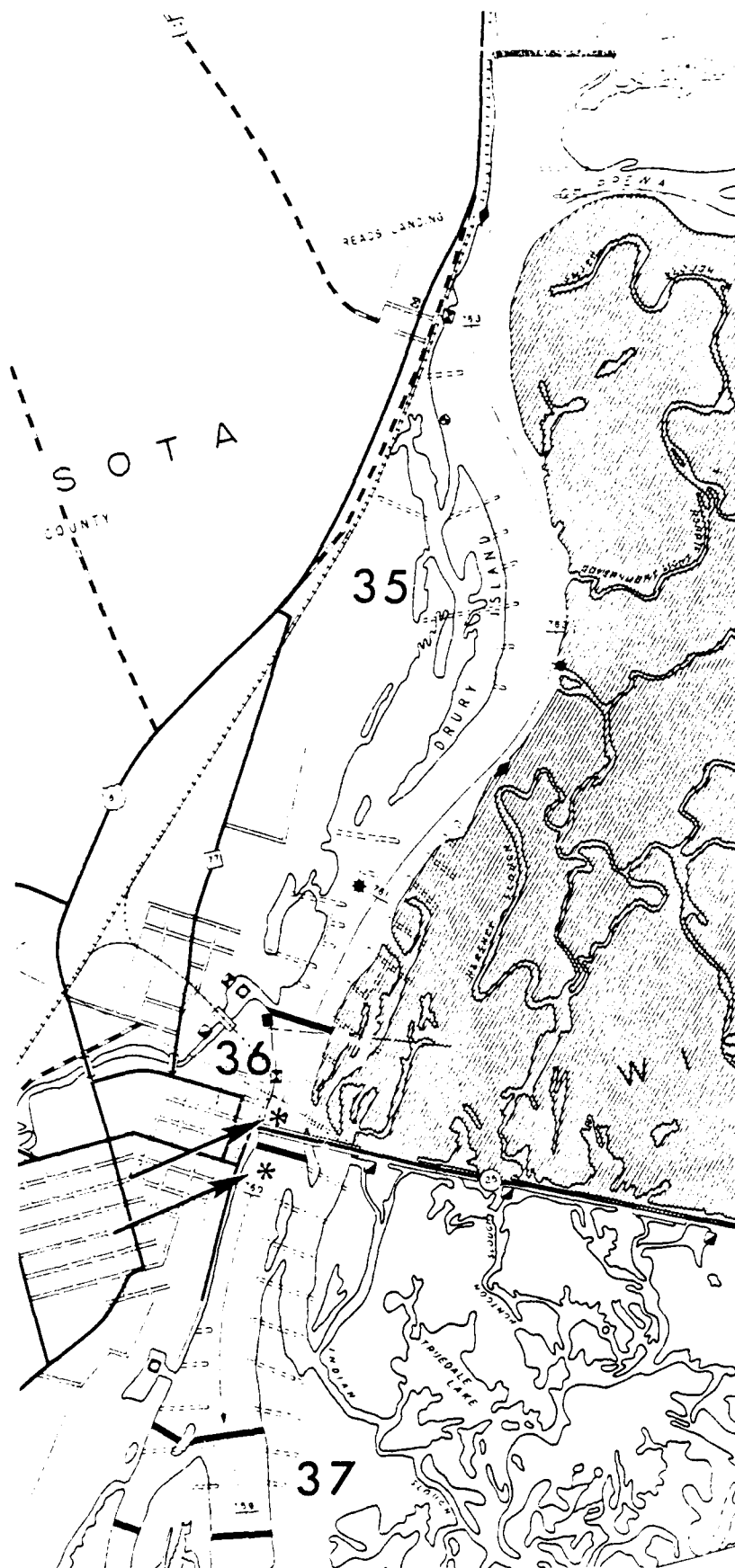


Exhibit 224

- 35. Reeds Landing
- 36. Wabasha Small Boat Harbor
- 37. Crats Island Bank Repair

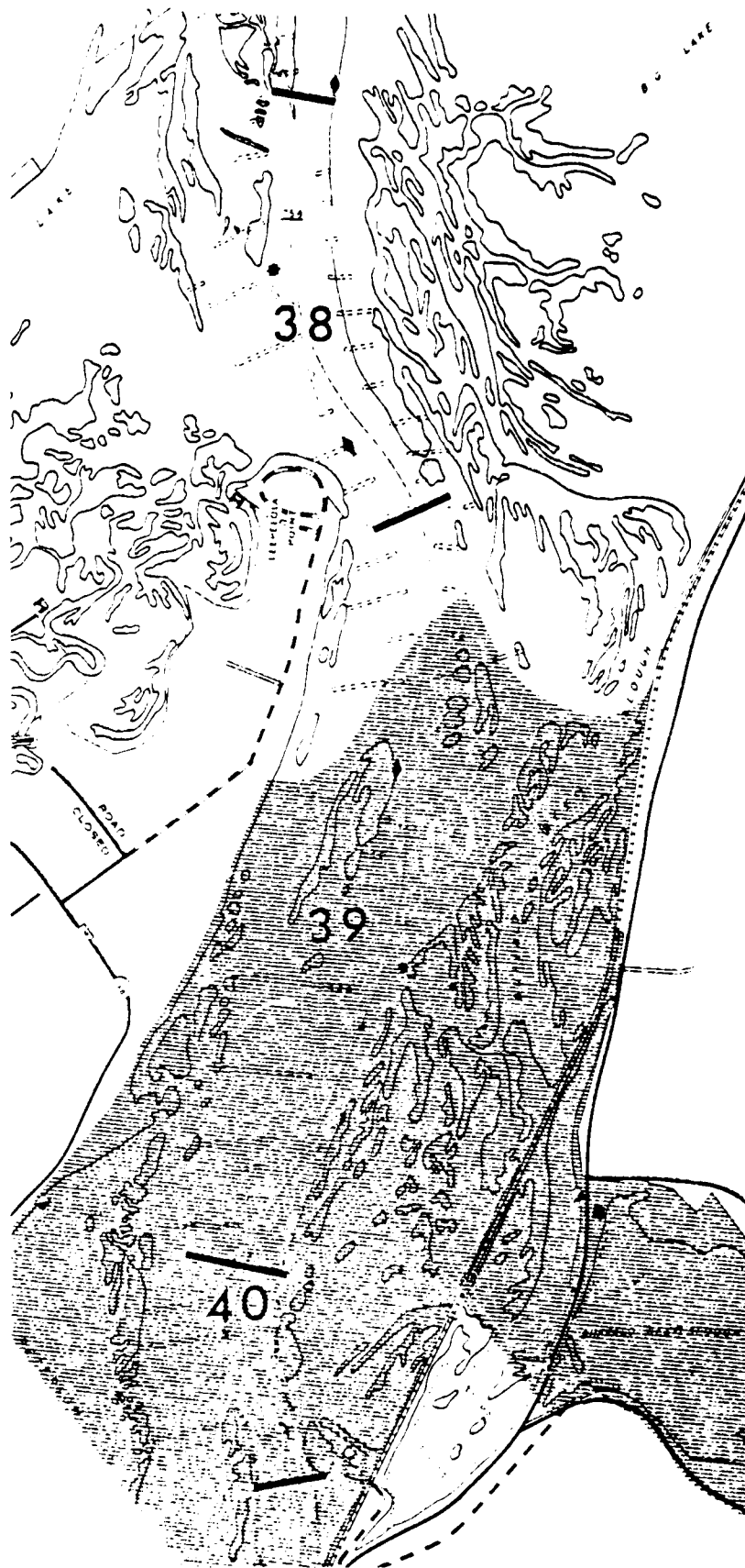


Exhibit 225

- 38. Teepeeota Point
- 39. Grand Encampment
- 40. Beef Slough

Exhibit 226

- 41. Locks and Dam 4 Lower Approach
- 42. Mule Bend
- 43. Head of Island 42 Bank Repair

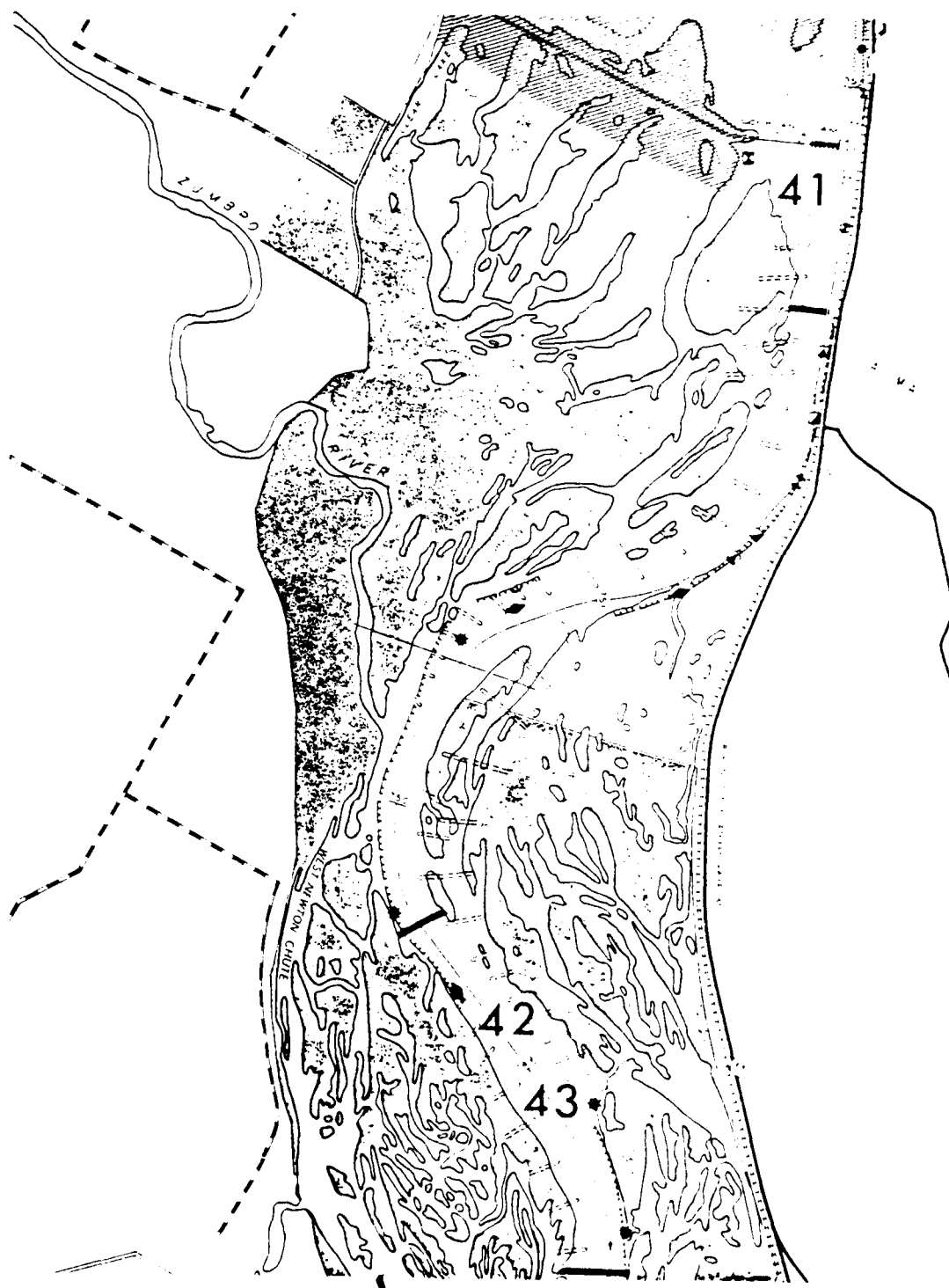




Exhibit 227

44. West Newton



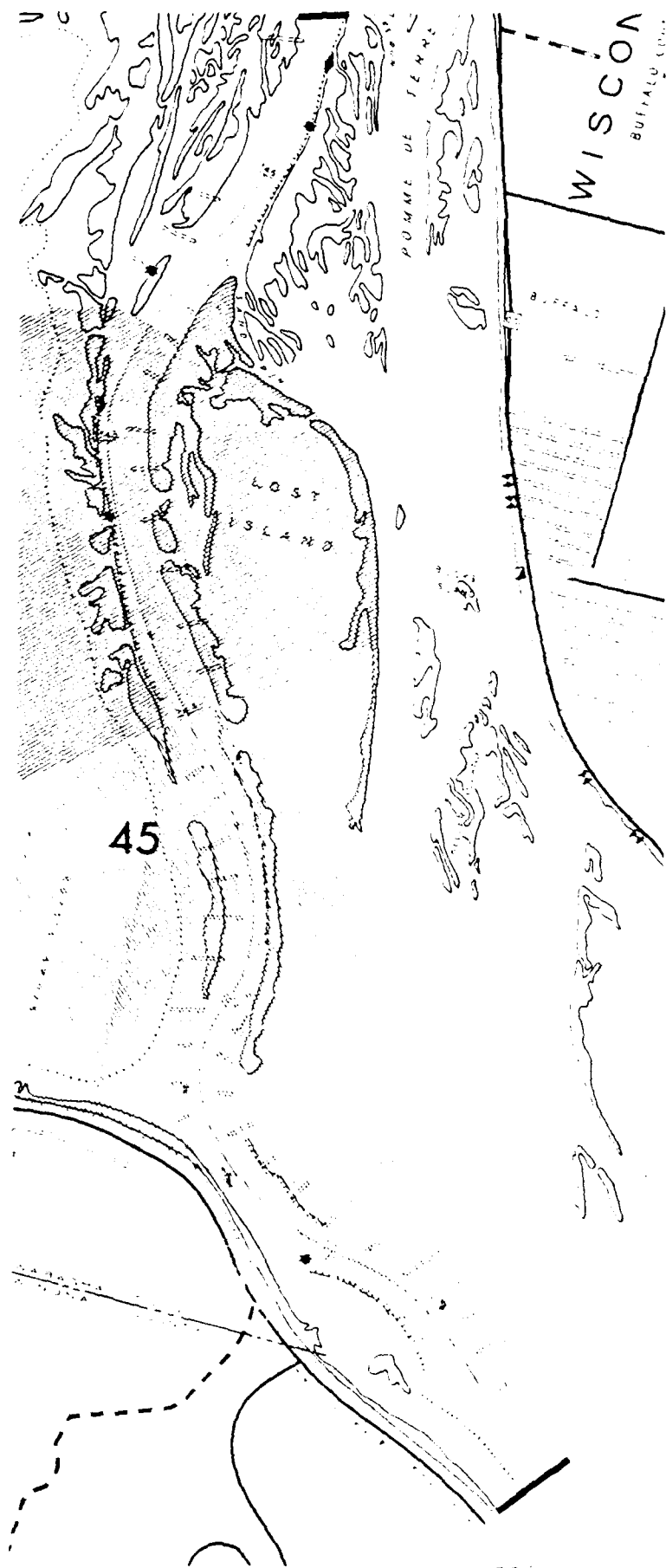
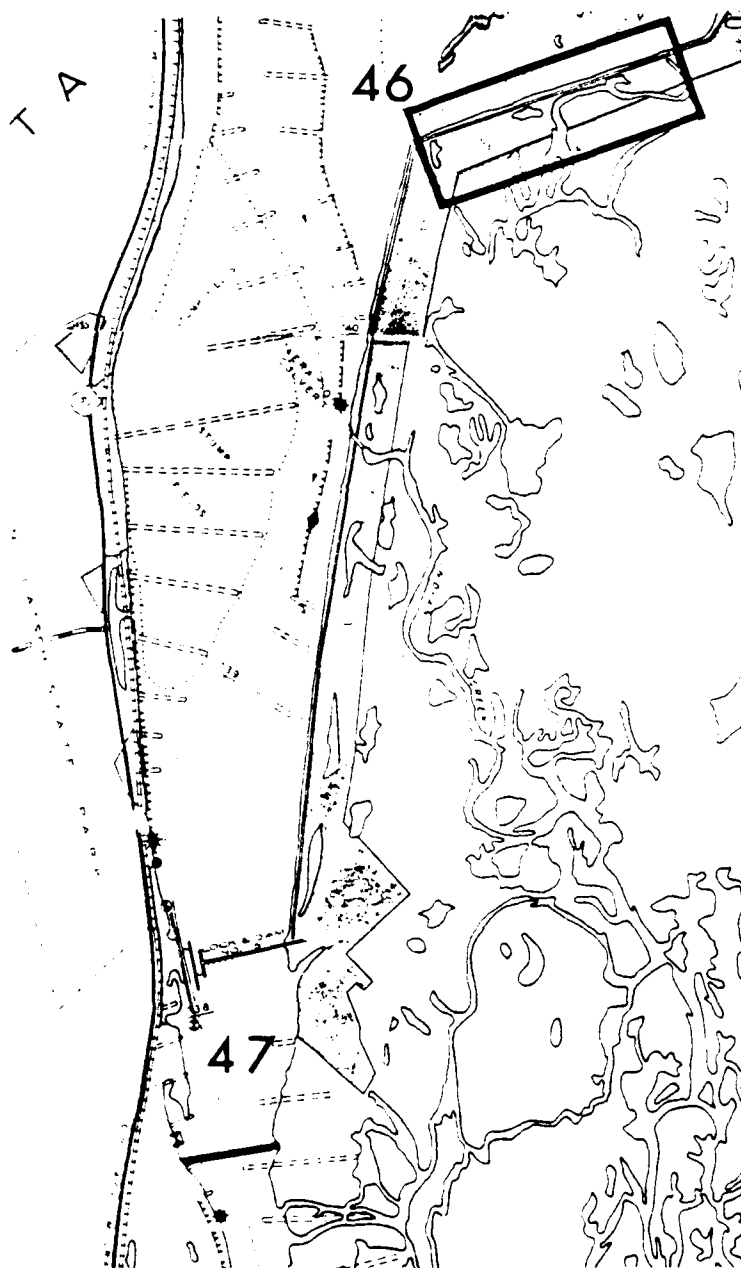


Exhibit 228

45. Weaver Bottoms Complex

Exhibit 229

- 46. Locks and Dam 5 Culvert Construction
- 47. Locks and Dam 5 Lower Approach



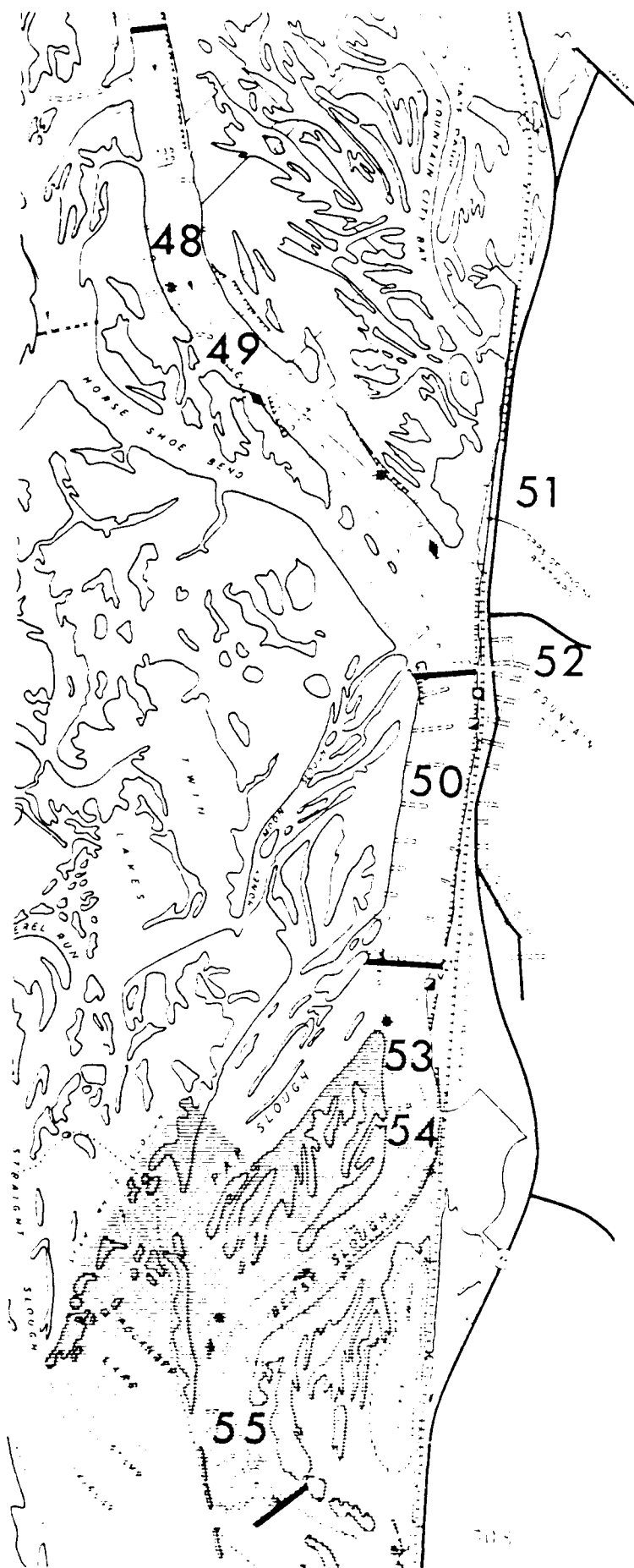


Exhibit 230

- 48. Island 58
- 49. Island 58 Bank Repair
- 50. Fountain City
- 51. Fountain City Service Base
- 52. Fountain City Small Boat Harbor
- 53. Betsy Slough
- 54. Betsy Slough Bank Repair
- 55. Wilds Bend

## Exhibit 231

## 56. Locks and Dam 5A Upper Approach

### 57. Locks and Dam 5A Lower Approach

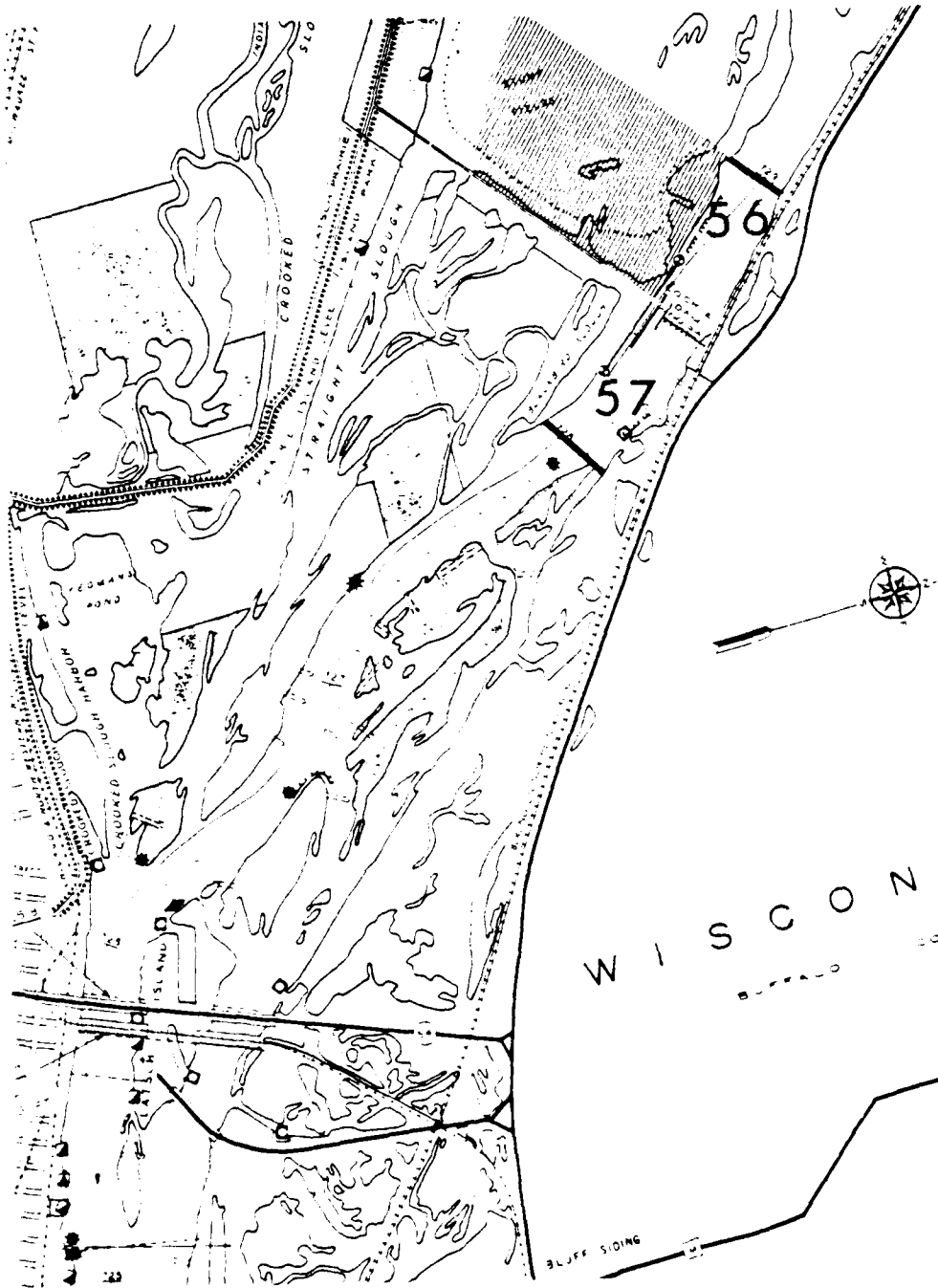


Exhibit 232

- 58. Winona Commercial Harbor and Small Boat Harbors
- 59. Winona Lower Railroad Bridge
- 60. Gravel Point

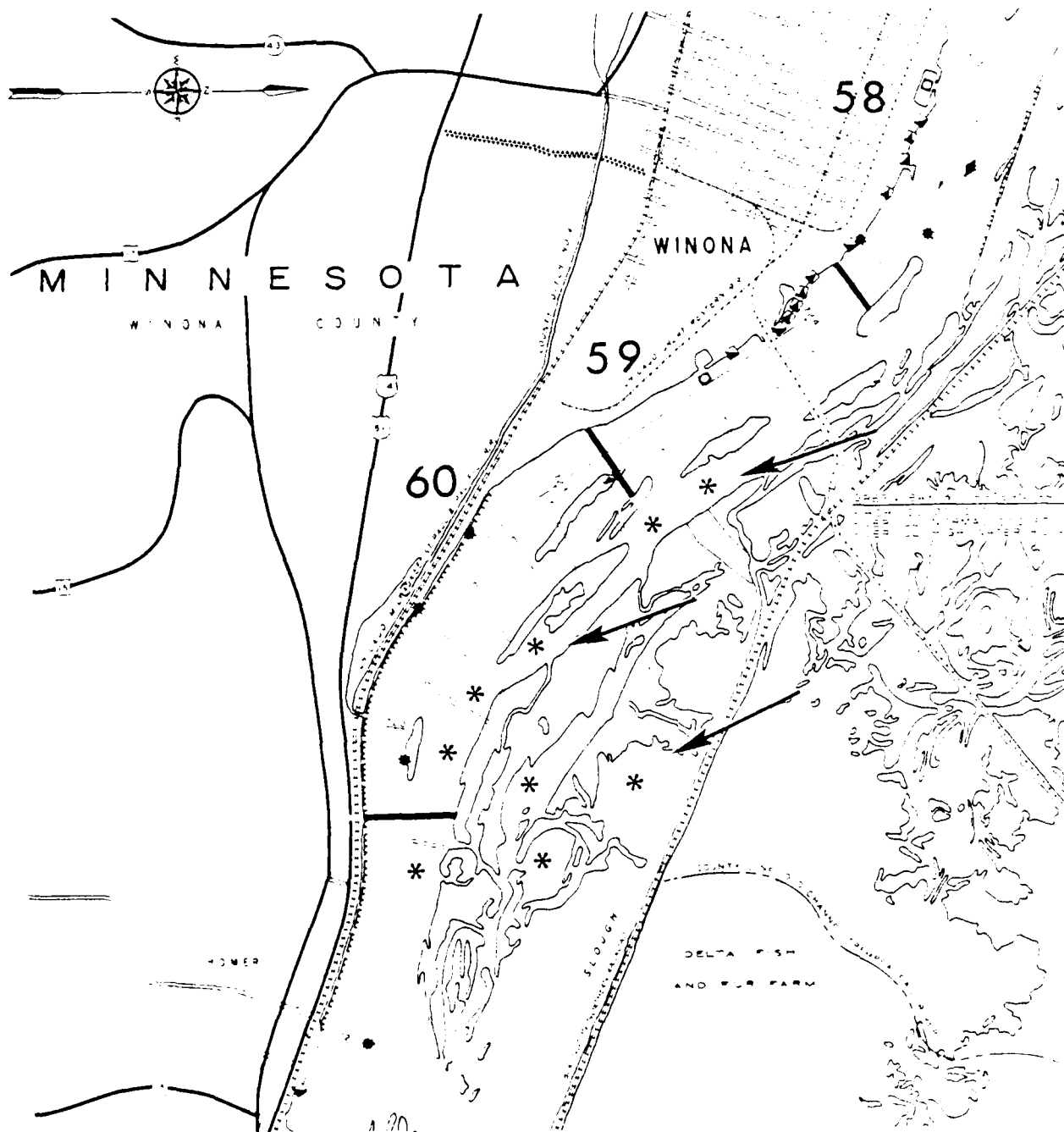


Exhibit 233

- 61. Locks and Dam 6 Lower Approach
- 62. Richmond Island
- 63. Queens Bluff

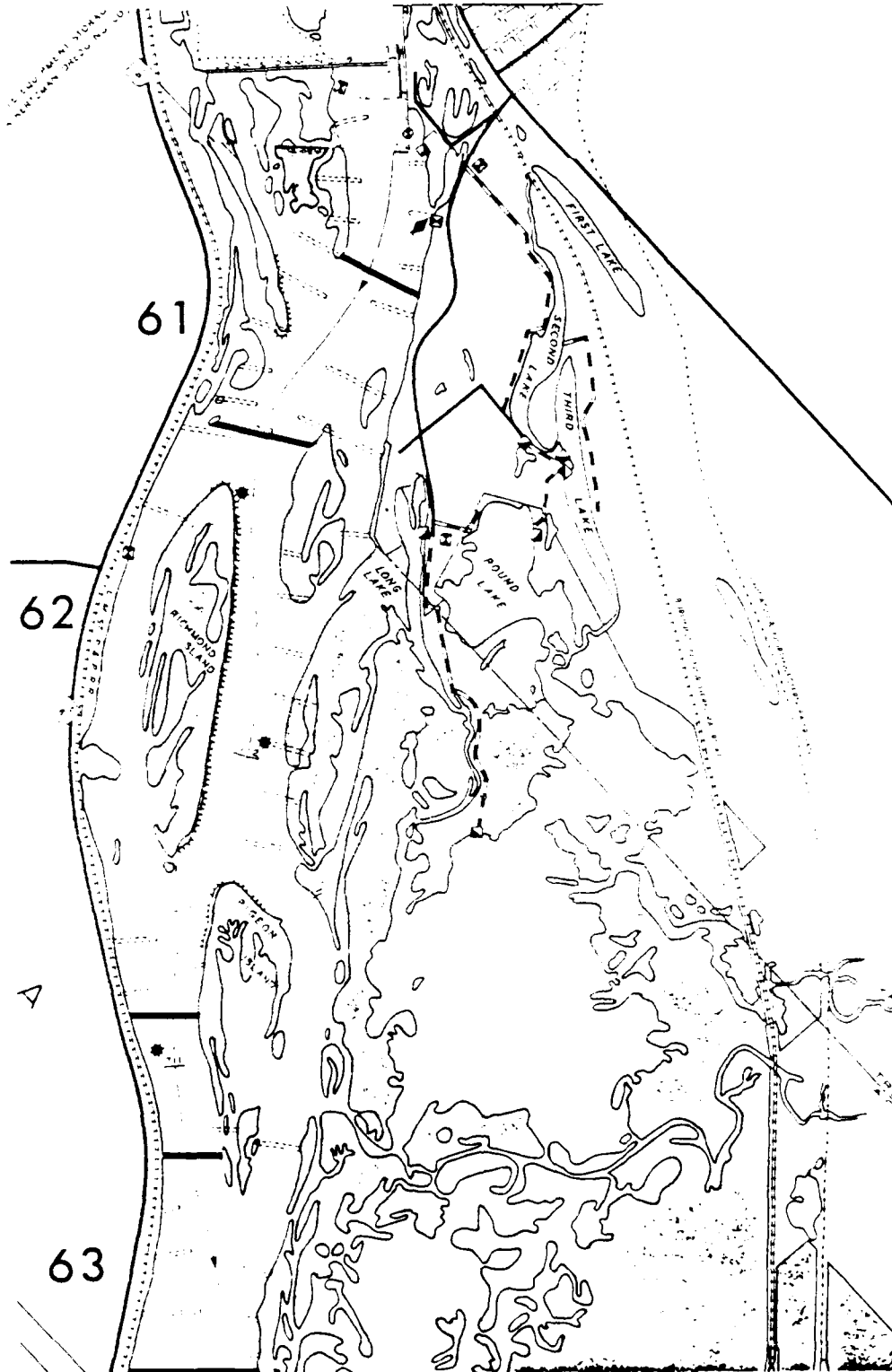


Exhibit 234

64. Locks and Dam 7 Upper Approach

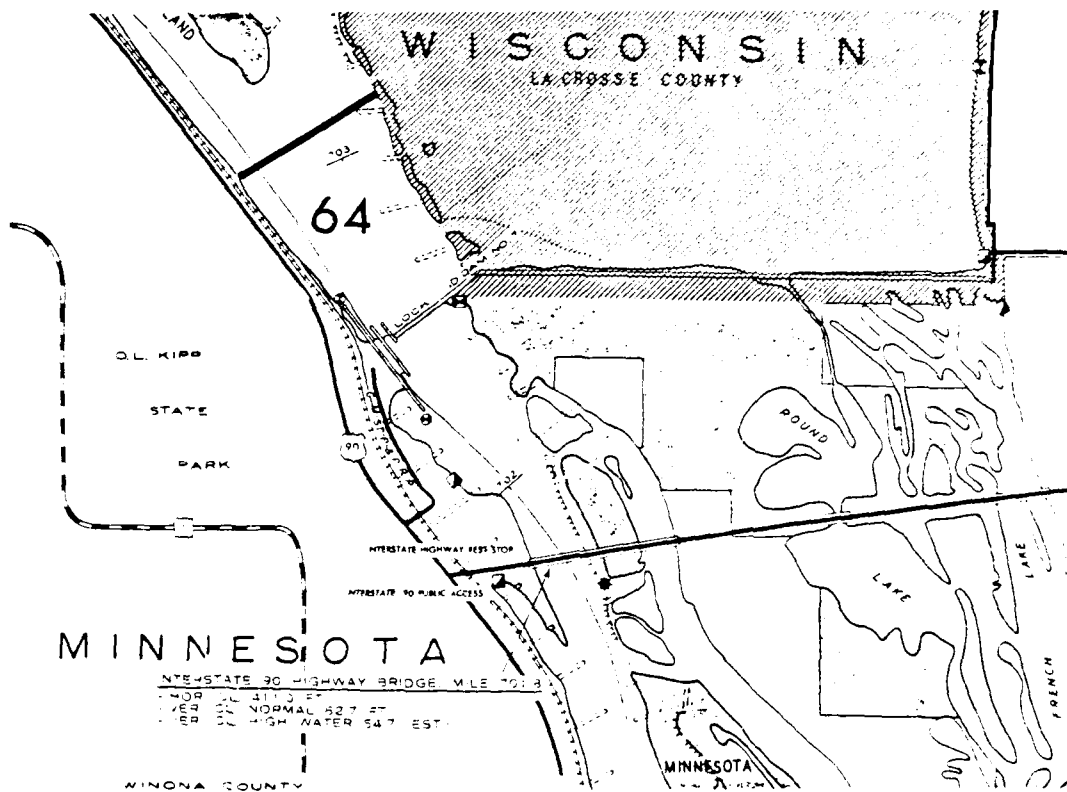




Exhibit 235

65. La Crosse Railroad Bridge

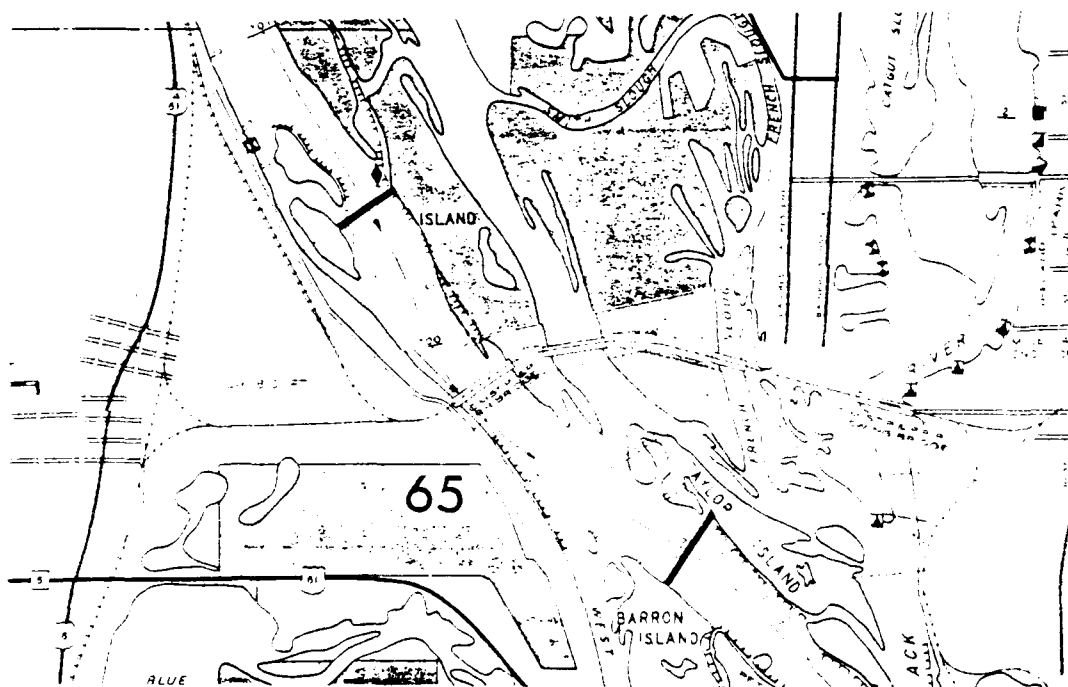


Exhibit 236

- 66. Hingen Island Bank Repair
- 67. Sand Slough
- 68. Sand Slough Bank Repair

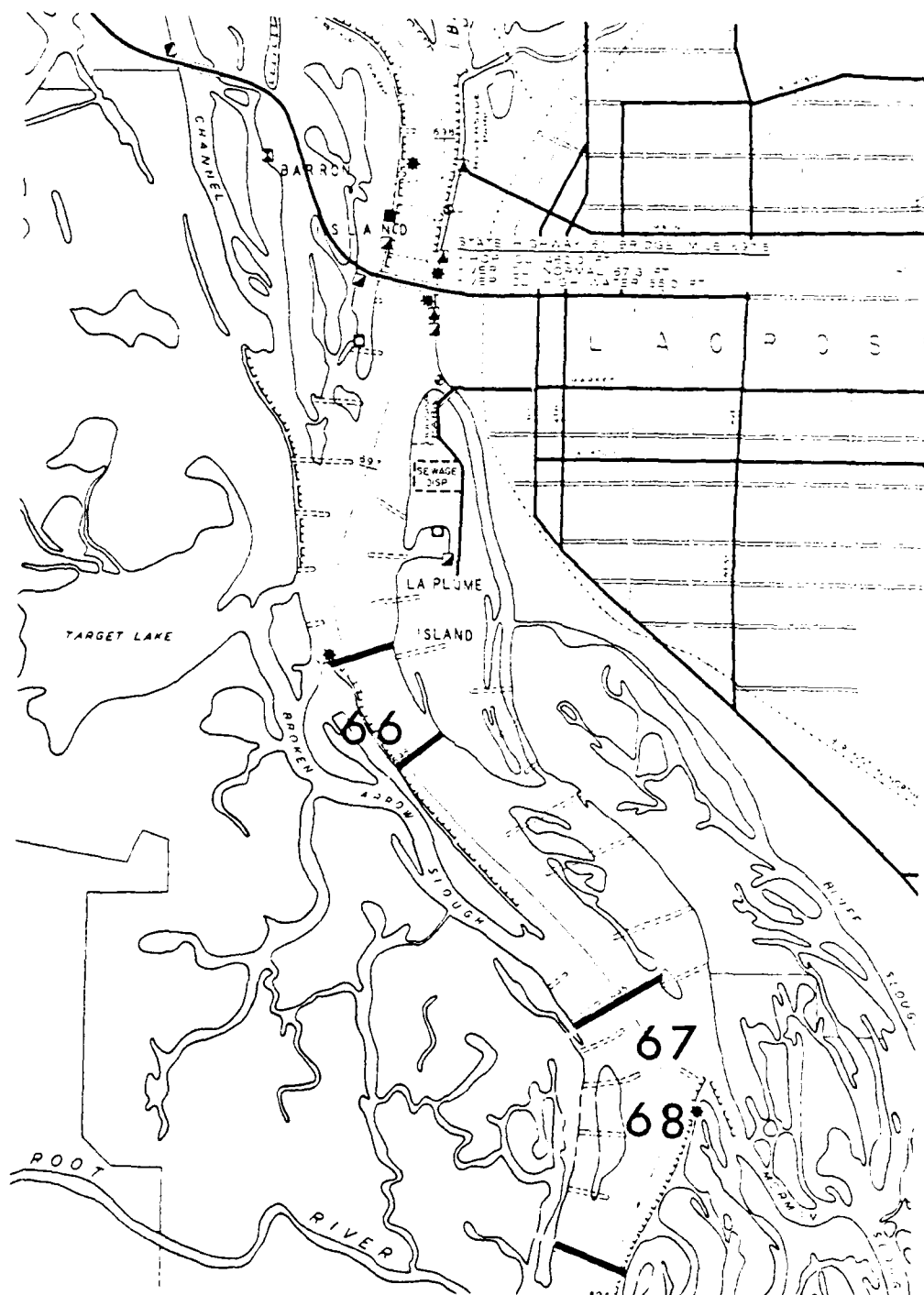


Exhibit 237

- 69. Root River
- 70. Picayune Island
- 71. Above Brownsville

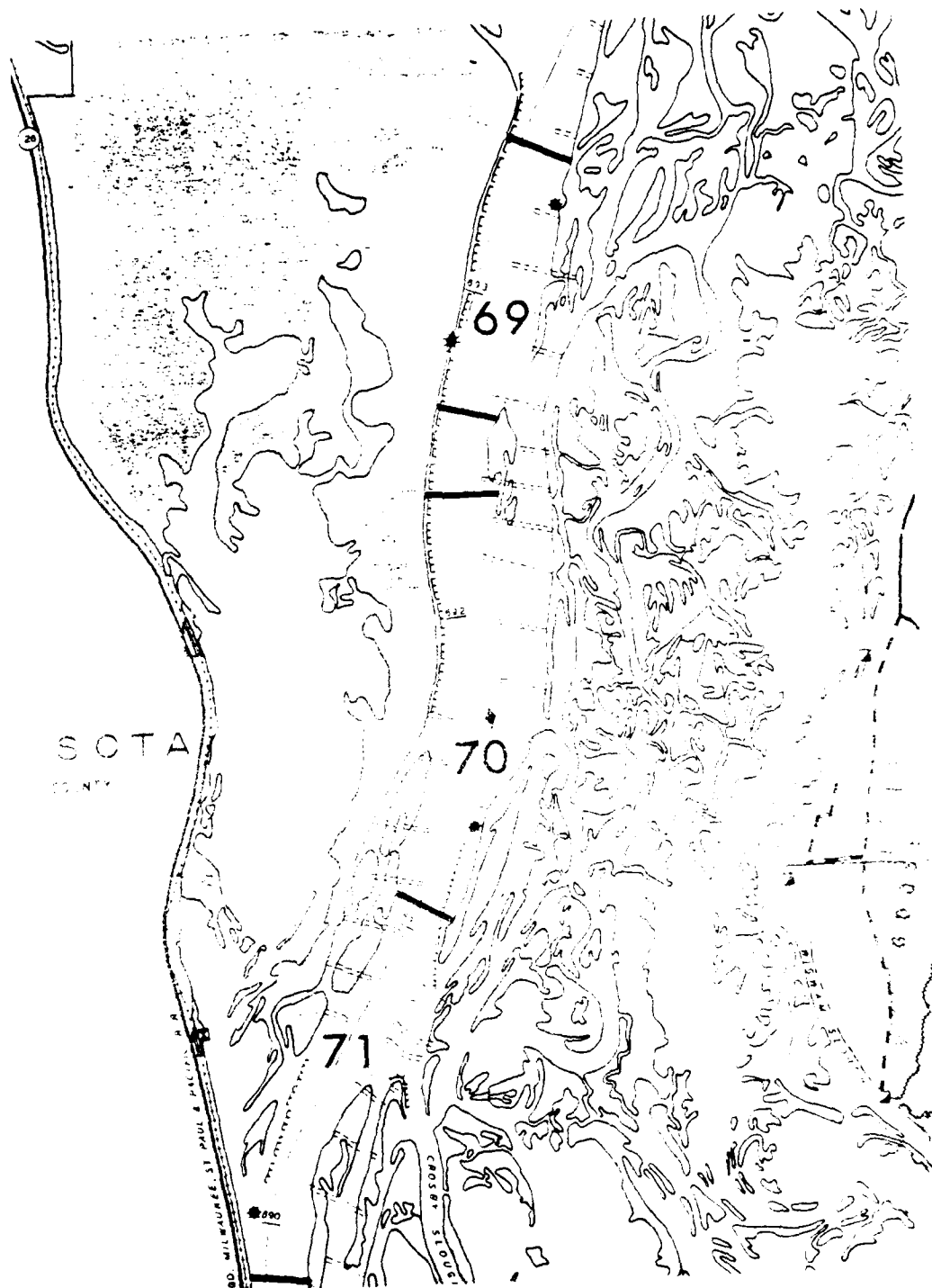


Exhibit 238

72. Brownsville

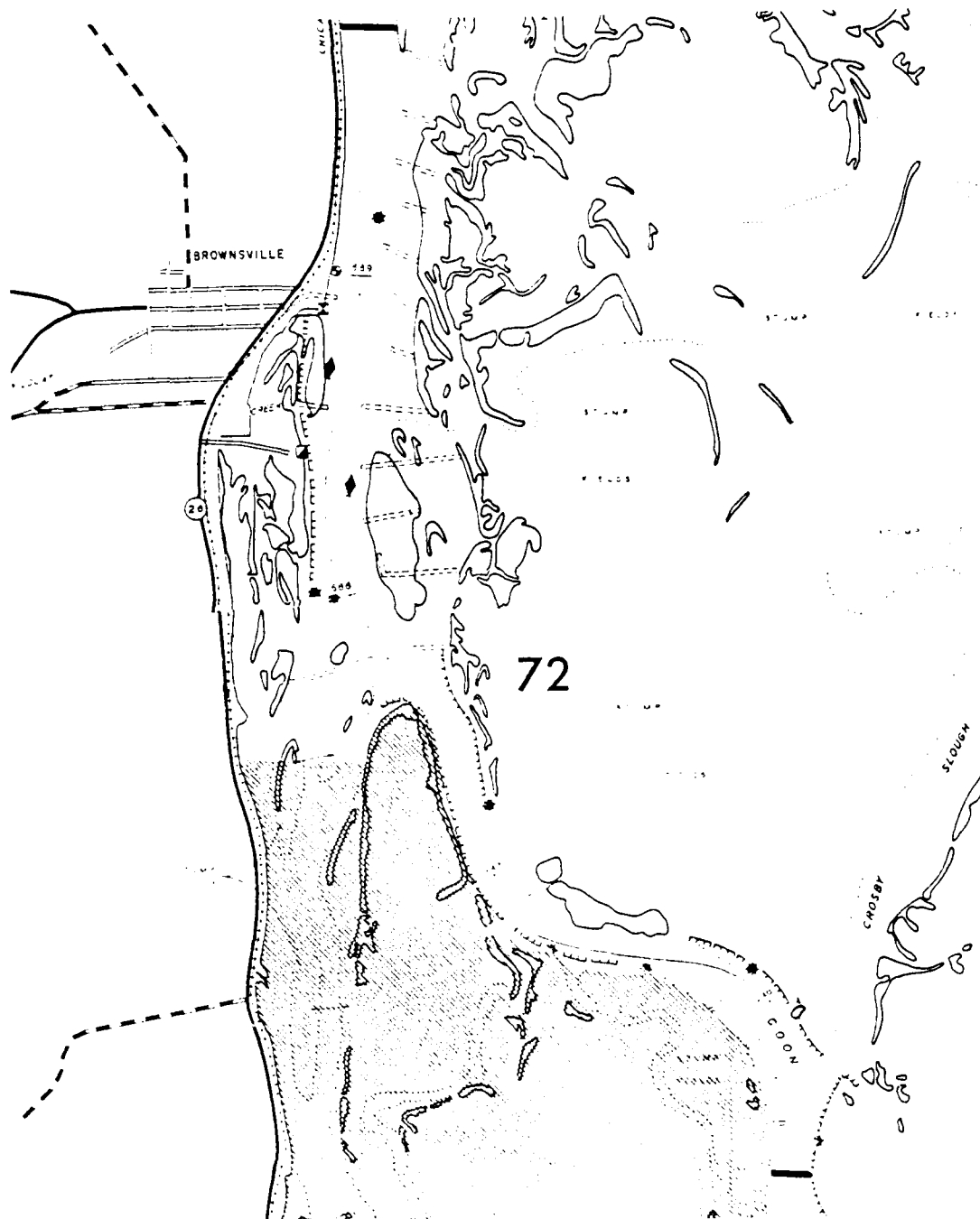


Exhibit 239

73. Crosby Slough  
74. Warners Landing

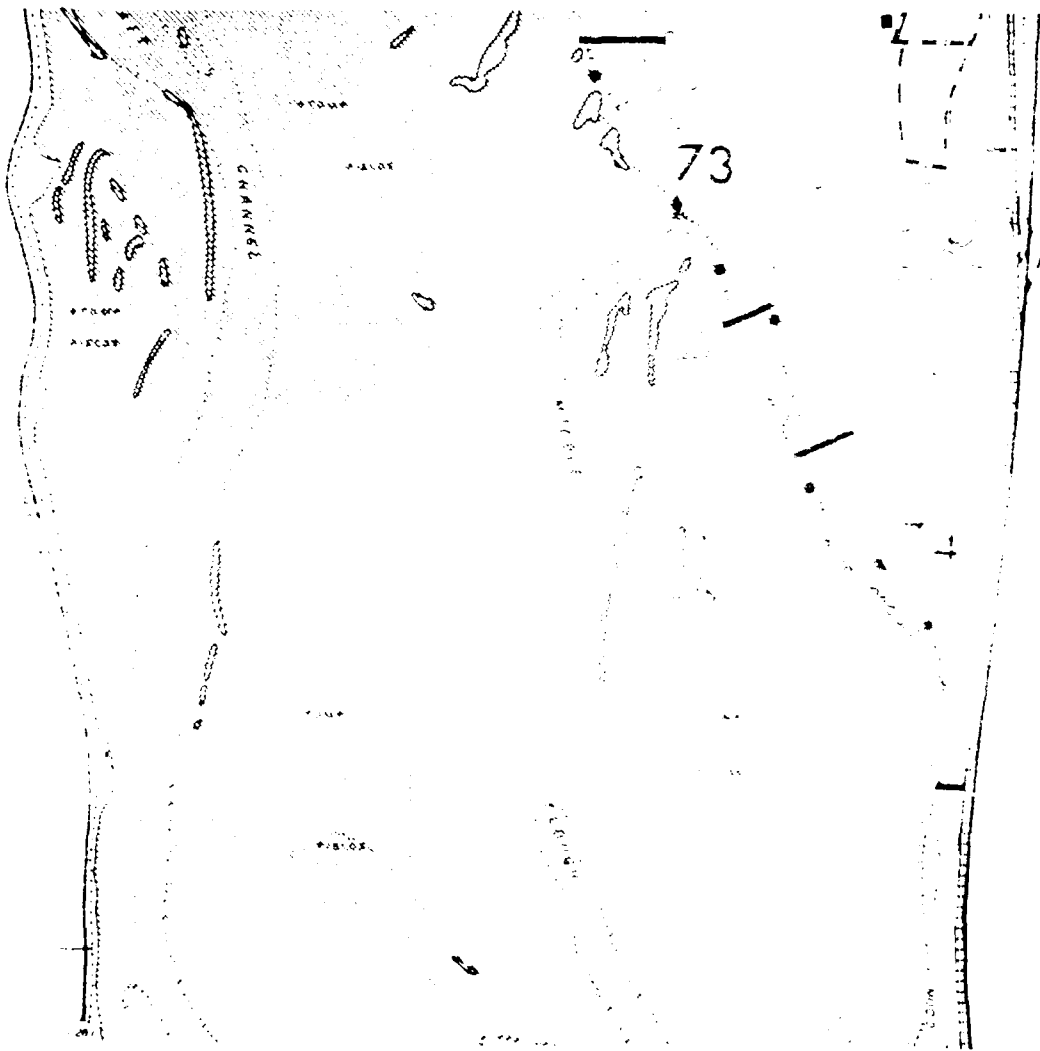




Exhibit 241

80. Battle Island

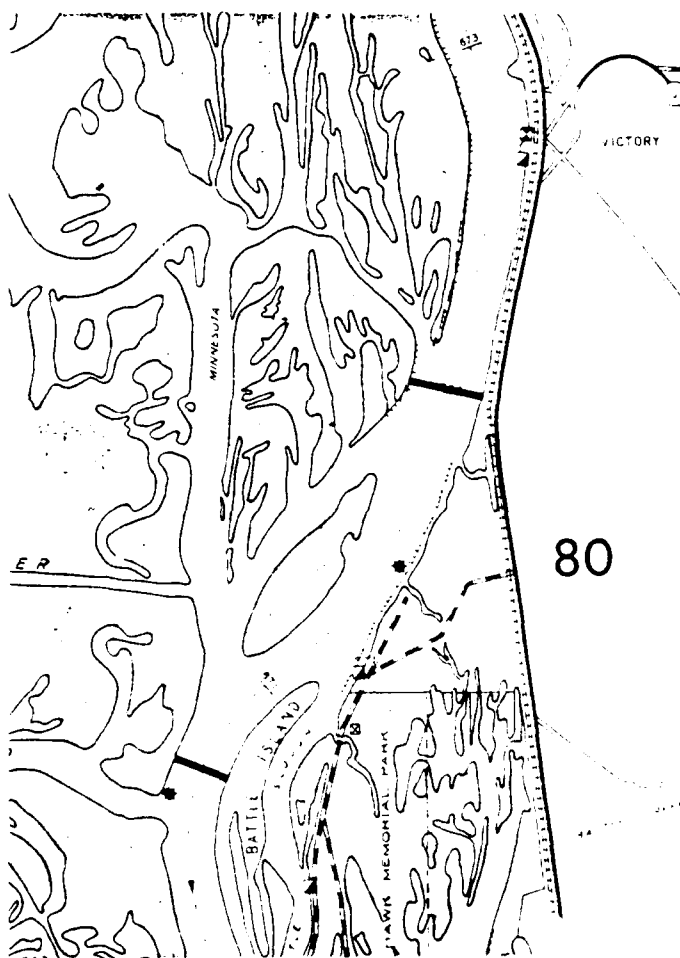
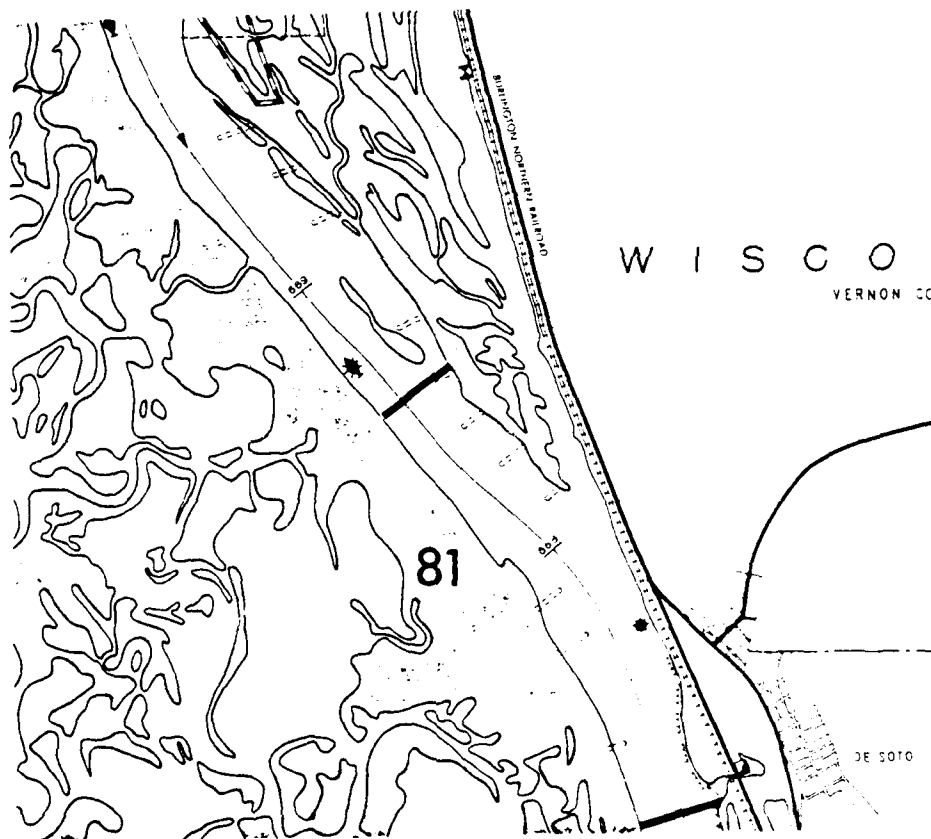


Exhibit 242

18. DeSoto





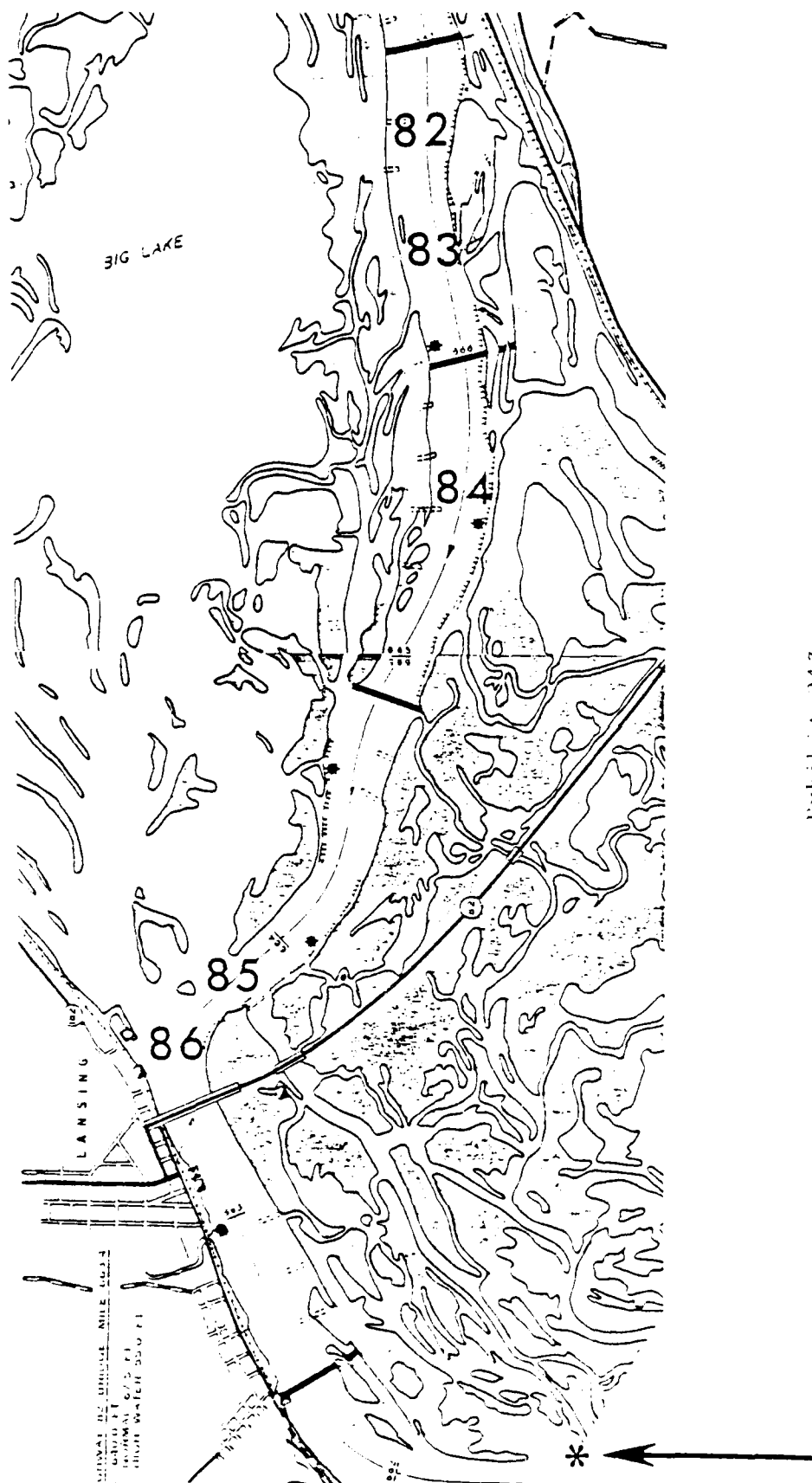


Exhibit 243

- 82. Above Indian Camp Light
- 83. Mouth of Hummingbird Slough Bank Repair
- 84. Indian Camp Light
- 85. Lansing Upper Light
- 86. Lansing Small Boat Harbor

Exhibit 244

87. Atchafalaya

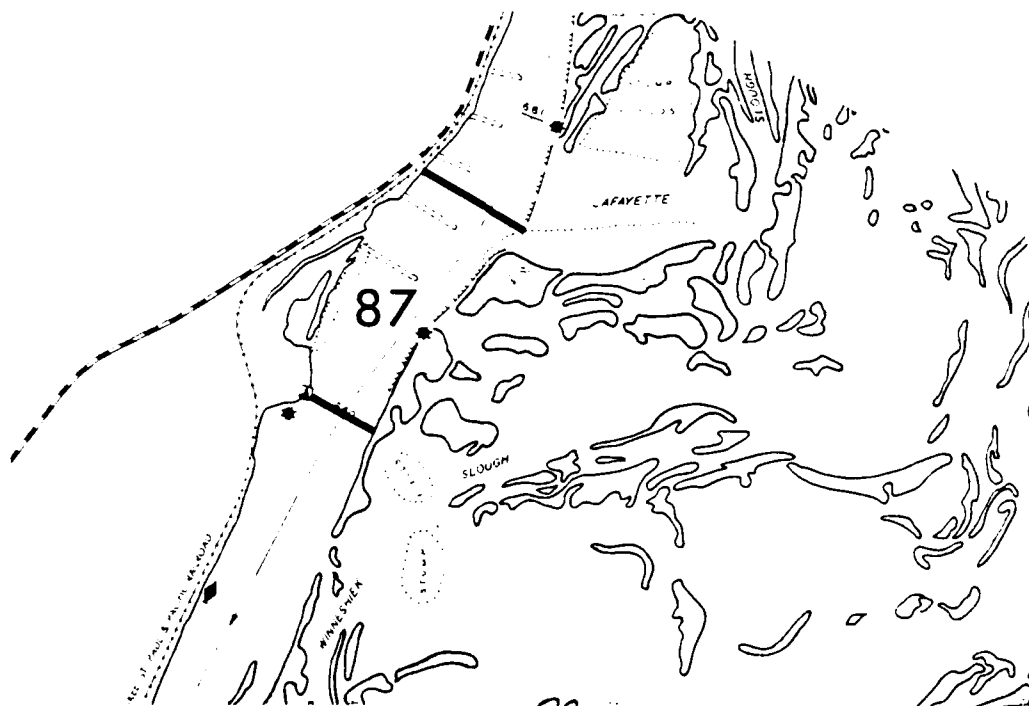
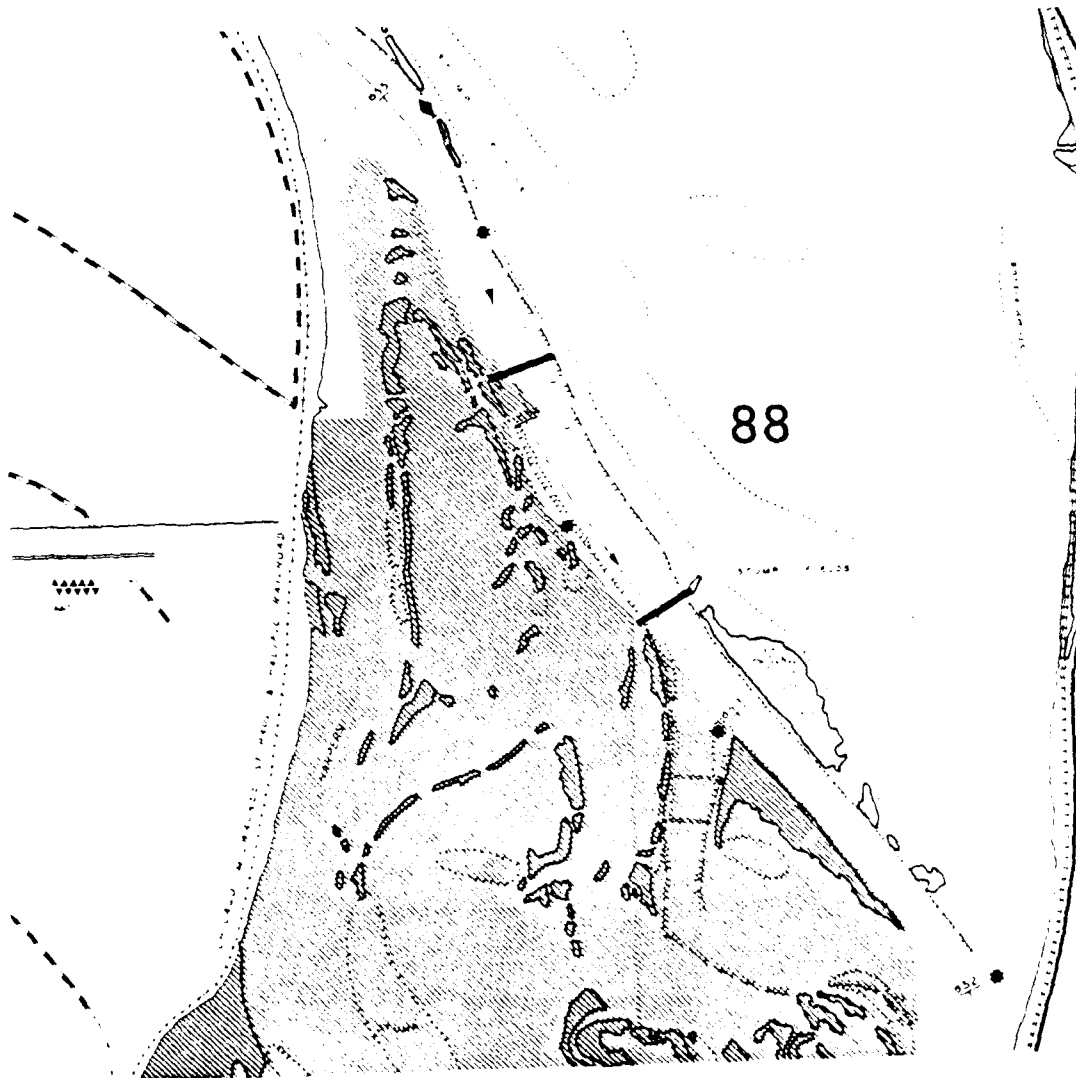


Exhibit 245

88. Crooked Slough



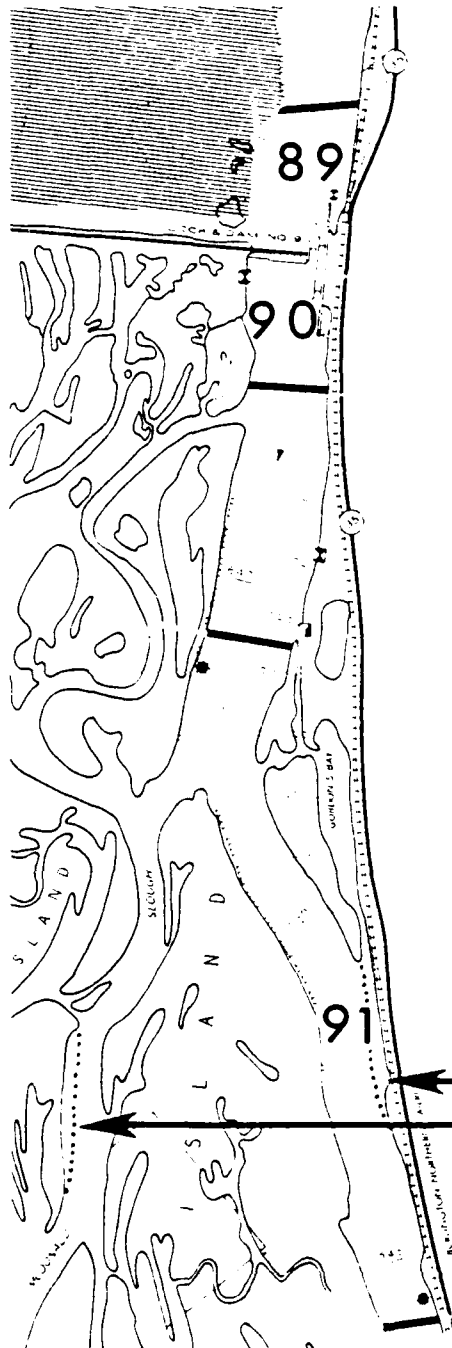


Exhibit 246

- 89. Locks and Dam 9 Upper Approach
- 90. Locks and Dam 9 Lower Approach
- 91. Hay Point Bank Repair

Exhibit 247

- 92. Jackson Island
- 93. Mississippi Gardens

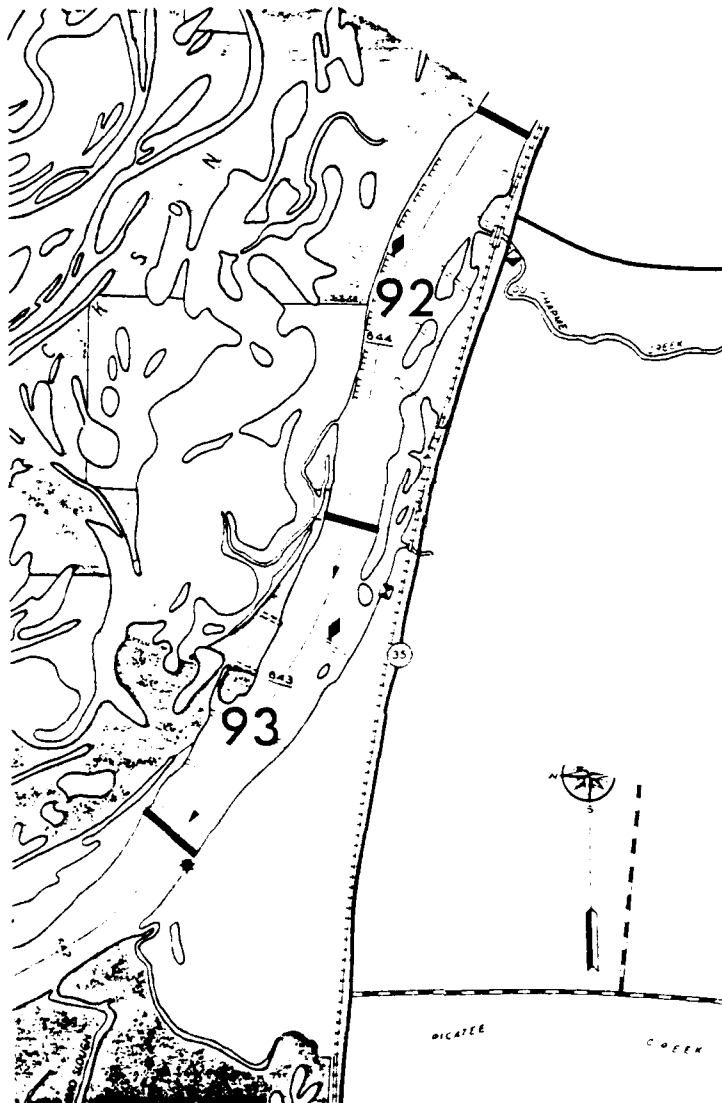


Exhibit 248

- 94. Prairie du Chien East Channel
- 95. Prairie du Chien Commercial and Small Boat Harbors
- 96. McGregor

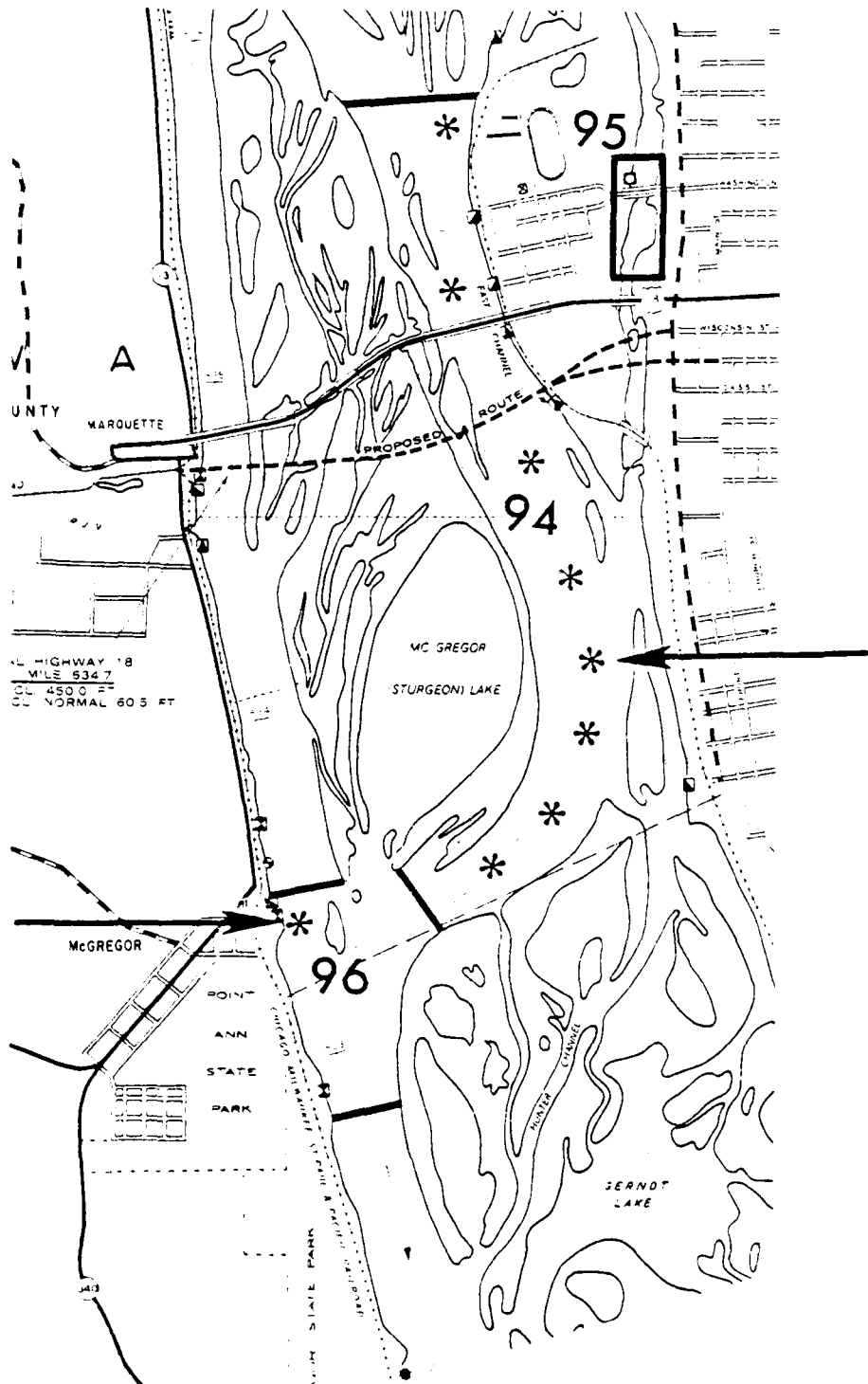


Exhibit 249

97. Wyalusing Bend Light  
98. Wyalusing

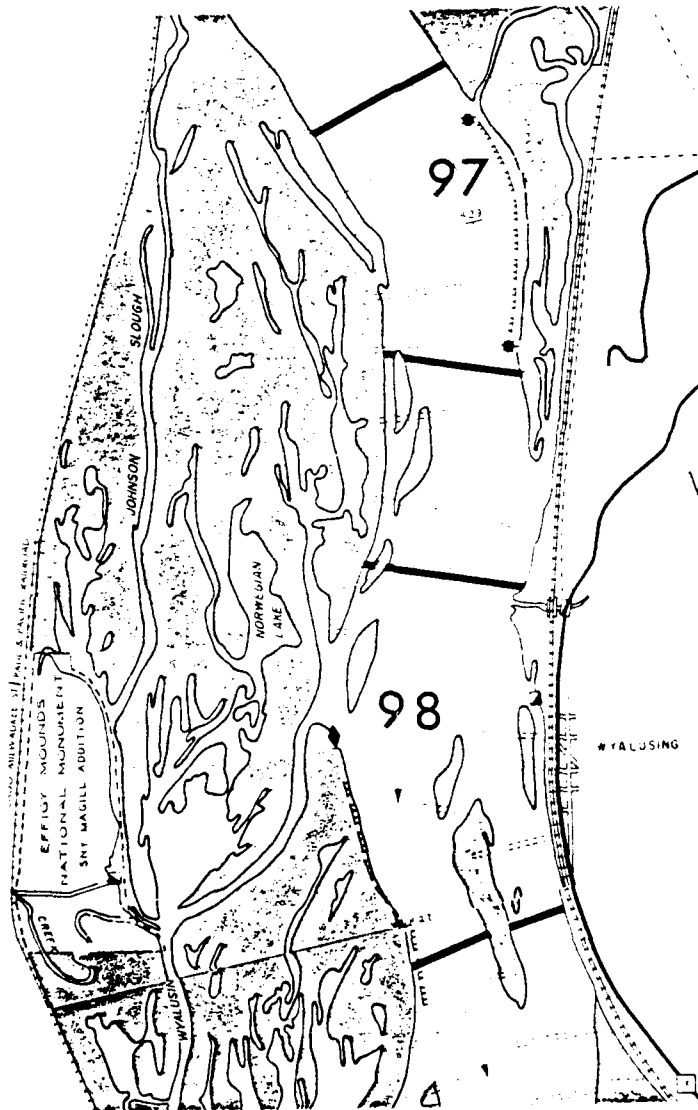


Exhibit 250

99. McMillan Island

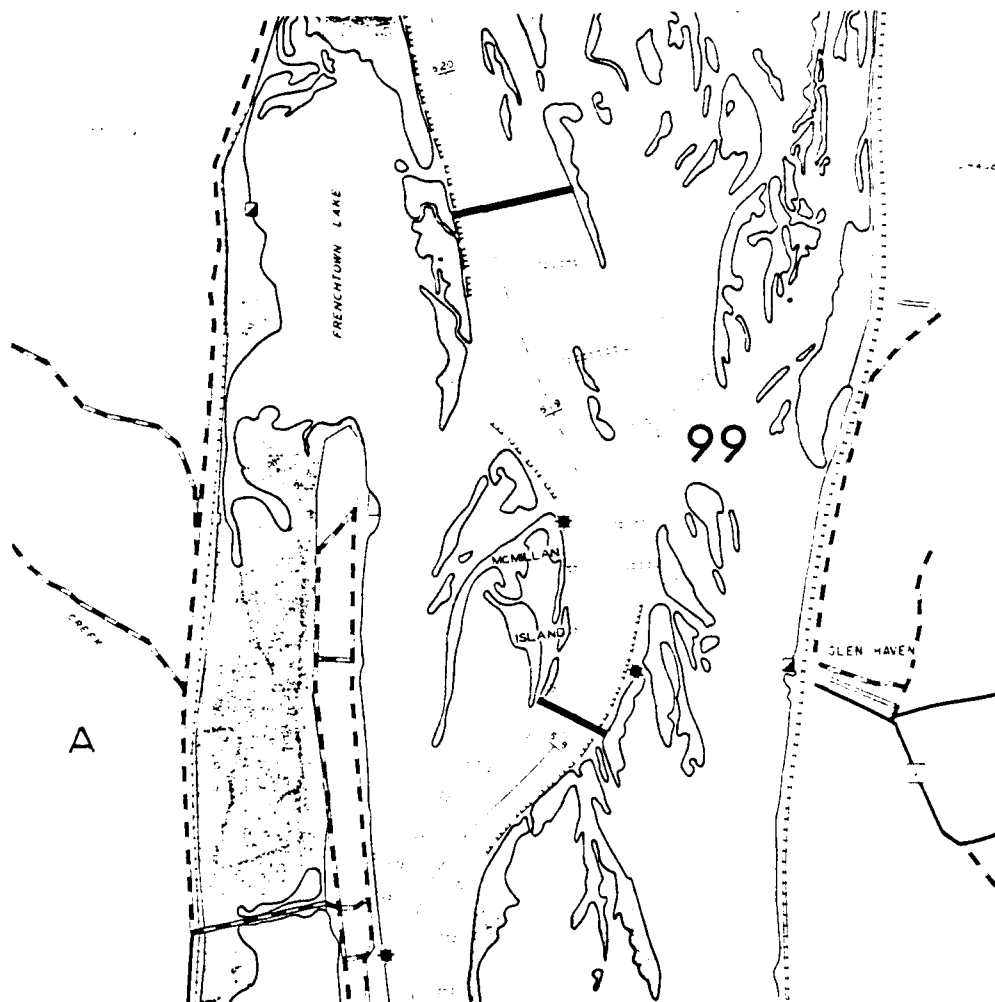
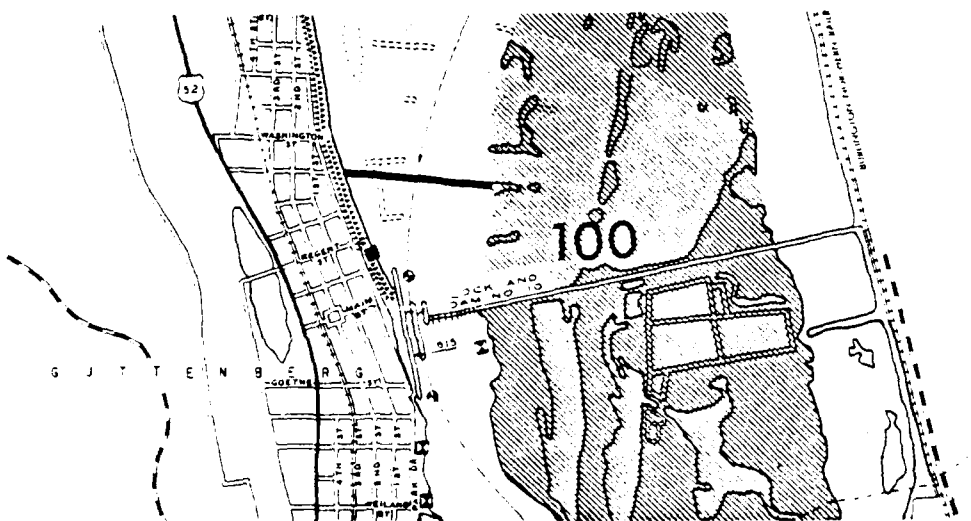




Exhibit 251

100. Locks and Dam 10 Upper Approach



Appendix E

Illustrated Key to Taxonomic Identification  
of Upper Mississippi River Recent Species-Group

Mussel Taxa

(Exhibits 252-299)

### Purpose of the Key

The following key to Recent Upper Mississippi River mussels is designed to facilitate identification of legally protected and other rare mussel taxa without killing the specimen. These rare taxa appear in early couplets to permit an investigator more rapidly to establish whether he or she has encountered such a species.

Identifying mussels is difficult because they have few characters and character-states in comparison to many other macroscopic organisms, such as arthropods (insects, crustaceans, etc.). It is even more difficult to identify *living* mussels, because dentition and many soft-tissue features normally are hidden by the valves. As perhaps originally advanced by Fuller (1971), however, freshwater mussels usually can be identified alive if the investigator is thoroughly familiar with the fauna under study, including aspects of the species' soft tissues. If a living mussel is left undisturbed in a vessel of habitat water, its valves eventually will open, and the mantle apertures, post-basal mantle margin, and marsupium can be observed. The following key depends chiefly upon these features and the outer surface of the adult shell. However, some specimens are hard to identify under any circumstances: examples include deformed animals and the males of certain taxa. Consequently, the key is extensively illustrated. Most identifications can be made simply by examining the figures. Especially because UMR mussels are a small fauna of macroscopic animals, the investigator can (and should) soon be able to recognize all 50 species-group taxa on sight.

No key can serve all conceivable goals equally well. By concentrating on identification of living organisms, this key, for example, is less useful in identifying empty shells. Once again, however, the illustrations alone probably will permit accurate (though perhaps not rapid) identification. Also, much strictly conchological information occurs in the key. Thus the key will be of some service to the beachcomber and the ethnomalacologist, as well as the neontologist.

This key is essentially artificial, i.e., it is a pragmatic tool of identification and thus stresses morphological similarities rather than natural relationships among taxa. Taxa do not "key out" in phylogenetic order. The illustrations, however, are in the phylogenetic order of Appendix A, Exhibit 1a.

### Mussel Biology Required For Use of the Key

A mussel can be "relaxed" in two senses: either it has been stupefied prior to fixation of its soft tissues, or it is relaxing

(in the usual sense) underwater in nature or in a laboratory setting better suited to observation. In any event, the observer whose goal is taxonomic identification must concentrate on three regions of the mussel's soft tissues (as opposed to the shell, which, also, is considered below). These three are the gills, the postbasal mantle margin, and the mantle apertures. These soft-tissue regions and their features, plus characteristics of the shell, are illustrated in the accompanying semi-diagrammatic drawings. Taxon-specific identification features are shown in the exhibits that follow the taxonomic key.

Like most bivalve mollusks, a freshwater mussel has two gills, one hanging in the mantle cavity on each side of the body. The gills have important functions in mussel nutrition, respiration, and reproduction; gill structure involved in reproduction is important in taxonomy. Each gill is divided into two apposing, unequal leaves, the inner and outer demibranchs. The marsupium is that portion of the gills that incubates the mussel larvae (glochidia). The morphology of the marsupium can be very important in taxonomy.

The Unionidae of the UMR exhibit several types of marsupia. In the tetragenous condition the marsupium occupies the entirety of both gills (i.e., all four demibranchs). The homogenous type of marsupium occupies the entirety of the outer demibranchs only. The heterogenous marsupium is more or less restricted to the postbasal portions of the outer demibranchs. In the mesogenous condition the marsupium consists of sacs extending below the middle of the ventral margin in the outer demibranchs. The diagenous marsupium is, in effect, a variant of the homogenous type in which the oval (egg) and larval (glochidial) masses lie perpendicular to the apposing walls of the outer demibranchs. There are other types of unionid marsupia, but they are not found in the UMR fauna.

Otherwise similar mussels from the UMR often can be separated by using marsupial types as discriminants. This tool is powerful when it can be used. However, it is often impossible readily to discern marsupial type unless the mussel is gravid (i.e., "charged" with eggs (i.e., ovigerous) or glochidia (i.e., larvigerous)), and gravidity ordinarily is a seasonal phenomenon that varies according to the taxa in question. In any event, the distribution of marsupial types among UMR naiad taxa follows as an aid in identification.

| <u>Marsupium Type</u> | <u>Taxa</u>  |
|-----------------------|--|
| tetragenous           | Margaritiferinae   |
| tetragenous           | Ambleminae: Amblemini<br>(except <i>Cyclonaias</i> ), plus<br><i>Fusconaia</i> |

| <u>Marsupium Type</u> | <u>Taxa</u>  |
|-----------------------|--|
| homogenous            | Amblesminae: Elliptionini<br>(except <i>Fusconaia</i> ), plus<br><i>Cyclonaias</i> |
| mesogenous            | Amblesminae: Lampsilini:<br><i>Obliquaria</i>                                      |
| heterogenous          | Amblesminae: Lampsilini<br>(except <i>Obliquaria</i> )                             |
| homogenous            | Anodontinae (except<br><i>Strophitus</i> )   |
| diagenous             | Anodontinae: <i>Strophitus</i>   |

This table shows unequivocal relationships between and among mussel taxa and marsupial character-states. The relationships are clearcut and thus very useful in theory, but they are hard to use in practice because the investigator's specimen(s) may or may not be gravid and because gravidity can be hard to detect, especially by the naked eye and in the case of the homogenous marsupium.

Features of the postbasal mantle margin (PbMM) are consistently more useful in taxonomy than are those of the marsupium. The key issues are whether or not the PbMM is broad and/or papillose. Both states are considered advanced; in more primitive mussels papillation and/or great breadth of the PbMM does not occur. Broad and/or papillose PbMMs are confined to the Amblesminae: Lampsilini: Heterogenae. Seemingly anomalous instances of broad PbMM occur in other groups where large arborescent papillae require breadth of mantle margin as substrate for musculature that controls movement of such papillae; examples include the genera *Cumberlandia*, *Orthonymus*, and *Plethobasus*, plus, perhaps, the heterogenous species *Proptera purpurata* (which is essentially extralimital to the UMR). In two UMR genera, *Carunculina* and *Lampsilis*, there are specialized PbMM features: caruncles (single, colorful, enormous papillae on each side of the body) and flaps (single, large, colorful, fish-shaped structures on each side of the body).

Specialized features of the PbMM (e.g., breadth, papillation, caruncles, and flaps) usually vary according to sex and season. Breadth and papillation are common to both sexes, but ordinarily are better developed in the female, especially when she is gravid. Caruncles and flaps are peculiar to the female and may be better developed during gravidity. There can be mystifying exceptions to these "rules". For instance, the degree of flap development can be similar in both sexes of a

given species of *Lampsilis*, and the flaps of otherwise distinct species in this genus can greatly resemble each other. Such phenomena can, of course, be results of undetected hermaphroditism and/or sibling species. A somewhat more defined example is the occurrence of the caruncle in *Carunculina*, for which this structure is diagnostic. Hermaphroditism is widespread in this genus (van der Schalie, 1970), and the Principal Investigator observed several gravid *C. parva* from the mussel beds opposite Winona, Minnesota, that lacked caruncles. Histological analysis of gonadal tissue may or may not reveal a dominant sex in such individuals. In any event, it is clear that sexual features can be unstable and thus sometimes an uncertain basis for taxonomic determinations.

Features of the mantle apertures function as taxonomic discriminants that, in the Principal Investigator's experience, do not vary seasonally or according to the sex of the individual mussel. At the posterior end of a mussel the apposing mantle margins are somewhat constricted in order to form two openings through which the external, aquatic environment can interact with the internal environment within the mantle cavity of the animal. This mantle constriction creates the incurrent and excurrent mantle apertures. Inward through the lower, incurrent aperture flows water bearing food and oxygen. Outward through the upper, excurrent aperture flows a stream bearing the mussel's wastes (and usually, in season, the glochidia released by females).

The incurrent mantle aperture is never blocked by cohesion of the apposing mantle margins (or by other morphological means), but the excurrent aperture usually is abbreviated to some extent. The excurrent aperture usually is subdivided into anal (lower) and supra-anal (upper) portions by a suture between the apposing mantle margins. This subdivision is regarded as an advanced trait because it increases the force with which matter (including wastes and glochidia) is expelled from the parent. Expulsion of wastes is an obvious necessity; more efficient propulsion of glochidia increases the chance that mussel larvae may infect a host fish. If it is not subdivided, the excurrent aperture is termed entire.

After completing metamorphosis from the glochidial stage as a parasite on the host fish, the juvenile mussel excysts and settles to the waterway bed. It is very small (perhaps a centimeter in length) and usually sculpted. As the mussel grows, the juvenile shell becomes part of the beaks (umbos or umbones) of the adult shell, and its sculpture is called the beak sculpture. Because the adult shell thus includes the juvenile shell, a distinction is made in the key between the juvenile shell and adult shell growth. The distinction is important in cases where the beak sculpture is neoteinic, i.e., it continues onto the adult shell growth. This and other features of the beak sculpture (including its absence, if that is the case) are important taxonomic discriminants. Because the beak sculpture occupies the

oldest part of the shell, however, it is most subject to erosion and/or corrosion and thus cannot be detected on many specimens. For this reason beak sculpture as a discriminant is avoided in the key wherever possible.

In its simplest form beak sculpture consists of a few short, low, concentric ridges, straight or curved, whose ends angle rather sharply toward the dorsal shell margin. At these angles the ridge often is swollen. Later, younger ridges (i.e., those farther from the dorsal shell margin) may consist only of these swellings. Where the beak sculpture is neoteinic, these swellings continue onto adult shell growth as two diverging rows of tubercles, whose size varies directly with increasing distance from the dorsal shell margin. In some mussel groups (notably Anodontinae), the beak sculpture ridges curve upward at their midpoints. The result is a series of curved W's; the swellings or tubercles are at the apices of the V's that form the W's. This type of beak sculpture is called double-looped. In most beak sculpture the ridges are essentially parallel to the dorsal shell margin, but in some groups (notably *Carunculina*) they clearly are at an angle to the dorsal margin. This is oblique beak sculpture.

The sculpture on adult shell growth may be a continuation of simplified beak sculpture, as already noted, and/or it may include peculiar elements. These are of three types: tubercles, ribs, and plications.

Tubercles may be pointed, rounded, or shelf-like (lamellar). Large, rounded tubercles are called knobs.

Ribs are radial (i.e., extending from the beak to the shell margin), low ridges. Ribs usually are interrupted, i.e., they may not extend continuously from beak to margin.

Plications or plicae (adjective: plicate) are large, long, rather high ridges that run more or less subparallel to the dorsal and ventral shell margins. Plicate UMR genera are *Amblema* and *Megalonaias*.

Adult shell growth can be divided into several taxonomically meaningful regions. Dorsal, ventral, anterior, and posterior margins of the shell conventionally are recognized even though the point where one margin ends and the next begins can be very unclear. The region where the posterior and ventral margins join is called postbasal. The postbasal margin of the shell and/or soft tissues (especially the mantle margin) is taxonomically very important.

The mantle apertures are at the posterior end of a mussel. The animal's foot is at the anterior end. The anterior end is

buried in the riverbed when the mussel is alive; the posterior end protrudes into the water column. In the illustrations of mussels following the key (i.e., Exhibits 252-299) and in the text-figures (unless otherwise indicated) the posterior end is to the right in drawings of shells by Fuges and Whiting; to the left, in drawings by Call, Pilsbry, and Tottenham (the artists are discussed below).

The topography of the shell usually exhibits useful identification features. On the inner shell surface these are limited to the hinge plate and dentition. The hinge plate is the more or less broad and strong part of the shell along its dorsal margin. The pseudocardinal teeth are on the hinge plate beneath and/or slightly before the beaks. The lateral teeth lie along the plate behind the beaks and subparallel to the dorsal margin. The interdentum is the part of the hinge plate between the pseudocardinal and lateral teeth. Variation in the dentition provides stable taxonomic discriminants. The edentulous hinge plate lacks both pseudocardinal and lateral teeth. Alternatively, only the laterals may be absent. Except in occasional diseased individuals the pseudocardinals are never absent unless the laterals, also, are lacking. In other words, the dentition can exhibit one of three states: absent, only pseudocardinals present, and fully dentate. These variations are not used in the key, because its primary objective is identification of living mussels, and in order to examine the dentition of a living specimen one inevitably kills it.

The outer surface of the shell exhibits several regions. The anterior and posterior margins of the beak extend toward the ventral margin of the shell in two ridges. The anterior ridge is weak and does not extend nearly so far as the shell margin, but the posterior ridge is conspicuous and reaches the postbasal margin. The anterior slope (a poorly defined area) lies between the anterior shell margin and the anterior ridge; in contrast, the posterior slope is well defined and lies between the posterior shell margin and the posterior ridge. It often is sculpted with tubercles and/or ribs.

Both the anterior and posterior ridges may be conspicuous if the beak sculpture continues far onto adult shell growth. In this case, one of the radial rows of tubercles in the neoteinic sculpture lies along the anterior ridge, the other, along the posterior ridge. Only in such a case (as in the genera *Quadrula* and *Arcidens*) can the existence of the anterior ridge be fully appreciated.


The area bounded by the beak, the anterior and posterior ridges, and the ventral shell margin is the disc. It ordinarily is a poorly defined, undecorated region, but, if the anterior ridge is conspicuous, the disc is easily recognized. In some species the disc is depressed and forms a broad, shallow furrow,



the sulcus. The sulcus usually involves a concave depression in the lateral outline of the ventral shell margin. *Quadrula quadrula* is the best example of these phenomena.

### The Artists

This appendix is illustrated by text-figures and by Exhibits 252 through 299. The Principal Investigator drew and initialed the text-figures, which are essentially diagrammatic (and bear the logo "slhf"). The drawings in the exhibits are life-like and very accurate. They were created by several artists, living or deceased: Call, Fuges, Pilsbry, Tottenham, and Whiting.

R. Ellsworth Call was perhaps the foremost student of mid-western freshwater mollusks during the latter Nineteenth Century. Much of his work is of a calibre that was somewhat ahead of his time; he deserves to be considered a malacologist, not a conchologist. Several of Call's monographs are included in the bibliography of Fuller (1978b) and/or the present report because of their bearing on UMR naiades. In addition, Call was a master scientific illustrator. His drawings that are used below are from Call (1895). They are reproduced without change (except such alteration as occurs in the photostatic process) and with the permission of the Academy of Science of St. Louis. Call signed each of his drawings with one of several characteristic logos (  , Call, R.E.C.). These have reproduced badly in the exhibits; consequently, Call's work is identified by "rc".

For 15 years, Mary Fuges has been a staff artist with the Academy of Natural Sciences of Philadelphia and has been a biological illustrator at several other institutions in this country and abroad. She created most of the mussel illustrations for the key, plus all of the drawings on the UMR naiad illustration poster that the Academy produced for the Corps and the Fish and Wildlife Service (Fuller et al., 1980). All her work in this report is signed "MF".

Henry A. ("Harry") Pilsbry may have been the finest malacologist that this country has produced. Certainly, the volume of his published work is rivaled only by W. H. Dall's (Boss et al., 1968) and probably never will be equaled or surpassed (Clench and Turner, 1962). Much of this productivity was accomplished during Pilsbry's many decades as head of the Department of Mollusks at the Academy of Natural Sciences of Philadelphia. In his youth Pilsbry was a colleague (and perhaps a protégé) of R. E. Call. He contributed some drawings to Call's (1895) "Unionidae of Arkansas"; a few are included in the exhibits that follow the taxonomic key (below). Pilsbry's logo on these drawings is "Pilsbry, del." in minute handscript that reproduces poorly in the photostatic process. Therefore, his drawings used here are identified by "hp". As in the case of Call's drawings,

Pilsbry's work is reproduced without purposeful alteration and with the permission of the Academy of Science of St. Louis.

John L. Tottenham prepared most of the drawings in Burch's (1973, 1975) pioneering manuals of Recent Nearctic mussel identification. Tottenham did not sign this work, so the symbol "jt" is used to identify those of his drawings that are reproduced in this report. Permission for this use was given by J. B. Burch.

Diane Whiting is a freelance scientific illustrator who resides in Stacy, Minnesota, and contributed drawings of mussel shells to Fuller (1978b) and the present report. Her work is signed with the logo "DW".

#### Further Aid in Identification

There are several excellent sources of further description and illustration that complement this key and its drawings and thus serve to improve one's understanding of the taxonomy, as well as the biology, of UMR naiades. These include Baker (1898, 1928), Burch (1973, 1975), Call (1895), Coker (1919), Eddy and Hodson (1950), Fuller et al. (1980), Havlik (1978), Mathiak (1979), Murray and Leonard (1962), Parmalee (1967), Starrett (1971), and Valentine and Stansbery (1971). In most cases, the more recent of these references are the better illustrated, employ the more up-to-date taxonomy, and are the more available, both in libraries and for sale. To the best of the Principal Investigator's knowledge, the works by Burch (1975), Fuller et al., Mathiak, Murray and Leonard, Parmalee, and Starrett are in print and can be secured from their respective publishers. In addition, one should be able to find at least some of these sources in public and/or institutional libraries in the UMR valley (the list of such repositories of this report that appears early in this Volume is of some guidance in this respect).

These 14 references are perhaps the best to be had at present for identification of UMR naiades, above and beyond the following key, but they do exhibit various strengths and weaknesses.

Baker's (1898, 1928) monographs are profusely illustrated, and his descriptions of species-group taxa that he honored are lengthy and detailed, but his nomenclature understandably is out-of-date, especially because Baker had a strong tendency toward the creation of needless subspecific names.

Burch's (1973, 1975) monographs are uniquely comprehensive and are illustrated with uncommonly exquisite drawings (most of which usefully depict typical shells). The value of Burch's work is lessened for the non-specialist because his identifica-

tion keys are natural, i.e., at least in their early couplets they depend upon phylogenetic discriminants. This approach is entirely proper, especially for the needs of the investigator who already is well versed in naiadology, but the uninitiate will not be well served by couplet-choices that concern, for example, characteristics of the charged marsupium, which are hard to observe and are evident only seasonally.

Call's (1895) paper is among the very few works devoted principally to UMR naiades. His illustrations are perhaps the best that ever have been done of mussel shells, but many of the relevant species were not drawn. Moreover, Call's descriptions, though elaborate, are exclusively conchological, and his monograph is very hard to locate today.

Coker (1919) published some of the best, photographic figures of UMR mussels that are available. The plate (XIV) that includes the Endangered *Lampsilis higginsi* was omitted from some copies, however, and the figure of *Cumberlandia monodonta* (Plate XXIV) is mislabeled *Margaritana margaritifera*. Coker's paper is additionally remarkable because it offers one of the few published illustrations of *Quadrula fragosa* (Plate VII, figure c).

Eddy and Hodson (1950) provided a good mussel key. Their book has been a staple in college biology courses for years and is widely available.

Fuller et al. (1980) is a two-part wall poster describing and illustrating all species-group UMR mussel taxa that the Principal Investigator recognized as members of this fauna in early May of this year. D. H. Stansbery (OSU, personal communication) has since confirmed two further species, *Quadrula fragosa* and *Pleurobema sintoxia*, whose identifying features are discussed below. The poster is available from USFWS, Region III, and USACE, St. Paul District, the sponsoring agencies.

Havlik (1978) and Mathiak (1979) offer excellent color photographs.

Murray and Leonard (1962) is an almost model handbook and field guide to much of the UMR mussel fauna. Their illustration of the Endangered *Proptera capax* shows an atypical specimen, which may not be a Fat Pocketbook at all.

Parmalee's (1967) handbook is the superior because it treats a higher proportion of the UMR fauna.

Starrett's (1971) has fine color photographs and includes perhaps the best extant discussion of *Lampsilis higginsi* and its close relatives (but see Buchanan, 1979a).

The paper by Valentine and Stansbery (1971) deals with a fauna that is somewhat extralimital to the UMR, but its taxonomic key, among the best available, is still very useful for identifications elsewhere in the Mississippi basin. Their work also explains the correct classification of *Proptera laevissima*, which some writers continue to misplace in *Leptodes*.

In addition to these primary sources of aid in UMR naiad identification there are numerous secondary references that have a more limited bearing on this fauna: Athearn and Clarke (1962), Baker (1922), Call (1900), Clarke (1973), Clarke and Berg (1959), Clench (1959), Cvancara (1970), Drew (1890), Goodrich (1932), Heard (1968), La Rocque (1966-1970), Marshall (1890), Ortmann (1919), Pennak (1953), Robertson and Blakeslee (1948), Scammon (1906), Stein (1962), van der Schalie (1948), and Walker (1918). This rather large number (19) of references is mentioned in order to improve one's chances of finding at least some of them and because several of them offer peculiarities that are worth emphasizing here.

Call (1900), La Rocque, and Ortmann treated a large fraction of the UMR naiad fauna. These works, plus Athearn and Clarke, Clarke, Clarke and Berg, and Cvancara, are unusually well illustrated. Marshall's paper is included in this selection because of his unparalleled drawings of beak sculpture.

About one-third of UMR species-group mussel taxa have been sole subjects of individual studies, some of which are of value in identification. These taxa and the corresponding studies are alphabetized below.

*Actinonaias ellipsiformis*--van der Schalie and van der Schalie (1963).

*Amblema plicata*--Fikes and Tubb (1971), Imlay (1972), Stansbery (1970), Stein (1968).

*Anodonta grandis*--Downing (1902), Penn (1939).

*A. imbecillis*--Allen (1924), Fuller and Hartenstine (1980), Heard (1975), Tucker (1927, 1928).

*A. suborbiculata*--Schuster (1978).

*Anodontoides ferussacianus*--Edgar (1965), Harman (1970).

*Carunculina parva*--Call (1896), Mermilliod (1973).

*Cumberlandia monodonta*--Stansbery (1966).

*Lampsilis higginsii*--Grier (1921).

*L. ovata ventricosa*--Cvancara (1963), Grier (1926b), Kraemer (1970), Welsh (1961).

*L. radiata siliquoides*--Blystad (1923), Counts (1977), Harvey (1969), Tedla and Fernando (1969).

*Ligumia subrostrata*--Bereza et al. (1976), Dietz (1974).

*Plagiola triquetra*--Johnson (1978).

*Pleurobema cordatum* complex--Badman and Chin (1973), Chin (1972), Yokley (1972).

*Proptera laevissima*--Coker and Surber (1911).

*Quadrula quadrula*--Neel (1941).

*Strophitus undulatus*--Ellis and Keim (1918).

*Tritogonia tuberculata*--Jones (1926). [Some of the soft-tissue description is inaccurate.]

#### Taxa Not in the Key

Fifty species-group freshwater mussel taxa presently are known to have been recorded from the UMR: 47 of these are treated in the following taxonomic key. The other three species are *Lasmigona compressa*, *Quadrula fragosa*, and *Pleurobema sintoxia*.

The key was completed during a period when the Principal Investigator was determined to excise *Lasmigona compressa* (Exhibit 291) from this report on the grounds that its single, possibly equivocal UMR record does not warrant the species' inclusion. This standpoint has since been reversed: the Creek Heelsplitter remains in the report and was treated by Fuller (1980b) and Fuller et al. (1980). This species "keys out" with *Anodonta imbecillis* (couplet-choice 38b) as long as the key is in its present form. *L. compressa* strongly resembles its congener *L. costata*, but lacks the latter's sculptured posterior slope (see, e.g., Fuller et al., 1980).

The presence of *Quadrula fragosa* in the UMR was claimed by Havlik and Stansbery (1978) and was verified by them earlier this year in the Principal Investigator's presence. Coker (1919:

Plate VII, figure c) published an excellent photograph of this species' shell. The False Mapleleaf seems to key out as Mapleleaf, *Q. quadrula* (couplet-choice 9a), but its soft tissues are undescribed, so its passage through couplets 1 through 8 cannot be evaluated. *Q. quadrula* differs from *Q. fragosa* most noticeably in that the latter's posterior slope is alate and much the more tuberculate.

*Pleurobema sintoxia*, Round Pigtoe, differs from Pink Pigtoe, *P. rubrum* (couplet-choice 6b), by being much more nearly subcircular in lateral outline of the shell.

### Text-Figures

The following captions and legends introduce 11 labeled text-figures that illustrate morphological features discussed above and used as discriminants in the key (below). The figures are semi-diagrammatic.

Figure 1. Left valve, lateral view.

Figure 2. Right valve, lateral view, complete dentition.

Figure 3. Right valve, lateral view, incomplete dentition.

Figure 4. Lateral view of an animal whose left valve has been removed and whose left mantle sheet has been removed along the heavy line.

Figure 5. Lateral view from the left of a *Lampsilis* exhibiting features of the posterior and post-basal mantle margins.

Figure 6. Tetragenous marsupium, lateral view from the left. Note that in both demibranchs the inter-lamellar septa are closely and about equally spaced.

Figure 7. Homogenous marsupium, lateral view from the left. Note that in the outer demibranch (od) the inter-lamellar septa are spaced about twice as closely as in the inner demibranch.

Figure 8. Mesogenous marsupium, lateral view from the left.

Figure 9. Heterogenous marsupium, lateral view from the left.

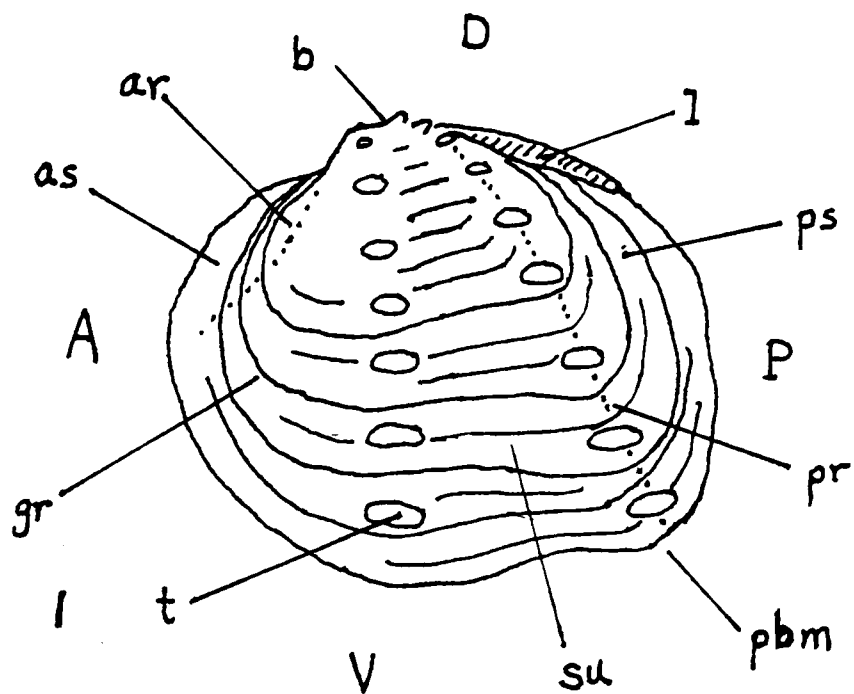
Figure 10. Structures of the posterior mantle margins in posterior view.

Figure 11. SAME.

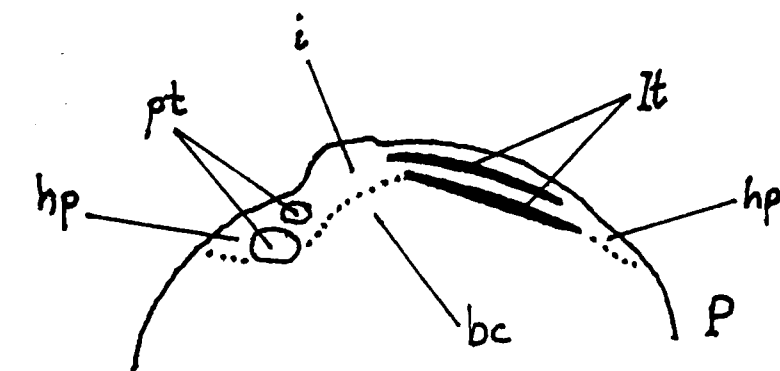
A -- anterior margin  
 aa -- anal aperture  
 aam -- anterior adductor muscle  
 ap -- arborescent papilla(e)  
 ar -- anterior ridge  
 as -- anterior slope  
 asaa -- auxiliary supra-anal aperture(s)  
 b -- beak  
 bc -- beak cavity  
 D -- dorsal margin  
 eea -- entire excurrent aperture  
 es -- eye spot  
 gr -- growth ring  
 het -- heterogenous marsupium  
 hom -- homogenous marsupium  
 hp -- hinge plate  
 i -- interdentum  
 ia -- incurrent aperture  
 id -- inner demibranch  
 l -- ligament  
 L -- left margin  
 lt -- lateral tooth (teeth)  
 mf -- mantle flap  
 mm -- mesogenous marsupium  
 od -- outer demibranch

op -- oral palpus  
P -- posterior margin  
pam -- posterior adductor muscle  
pbm -- postbasal margin  
pbmm -- postbasal mantle margin  
pr -- posterior ridge  
ps -- posterior slope  
pt -- pseudocardinal tooth (teeth)  
R -- right margin  
s -- shell  
saa -- supra-anal aperture  
sea -- subdivided excurrent aperture  
sp -- simple papilla(e)  
su -- sulcus  
t -- tubercle  
V -- ventral margin

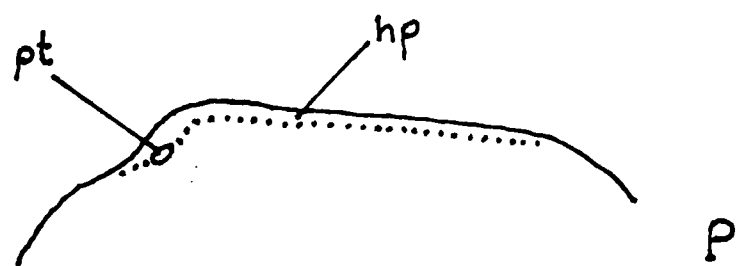




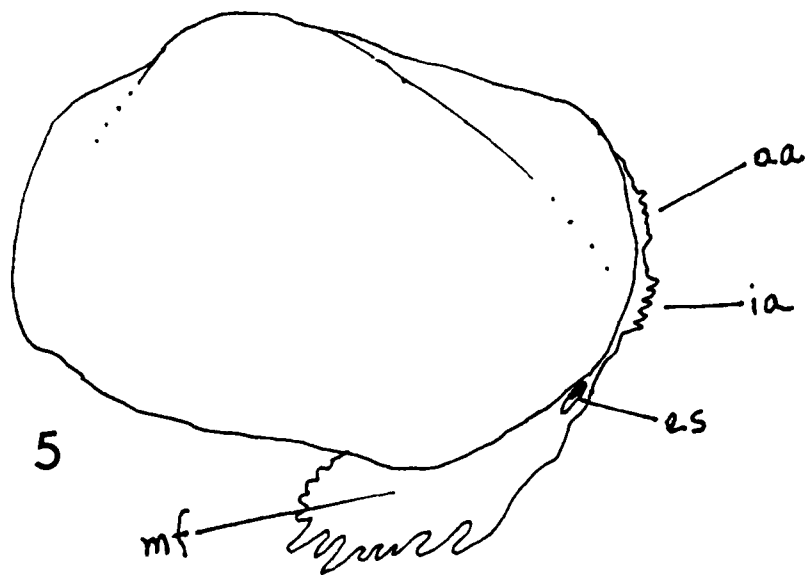
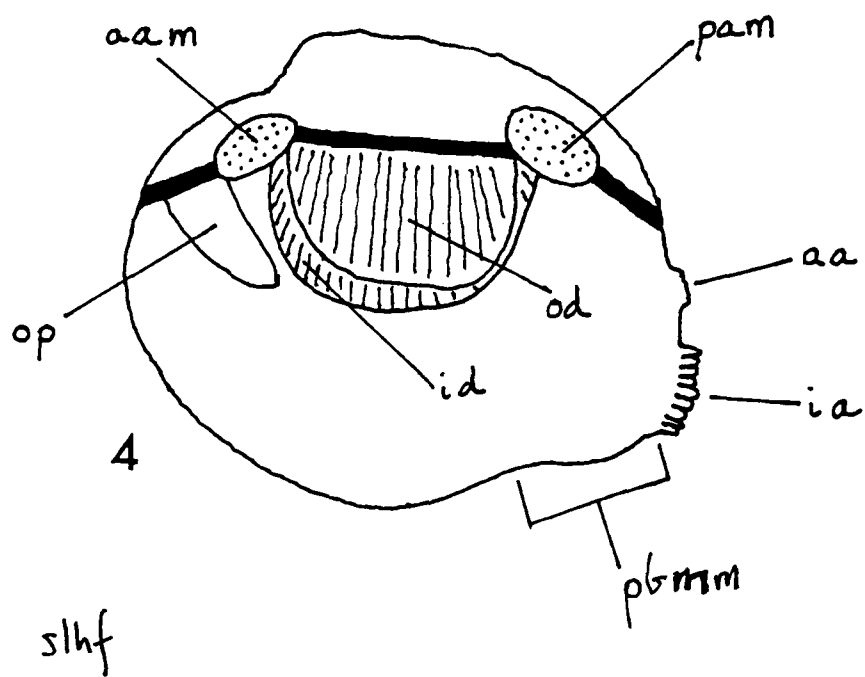
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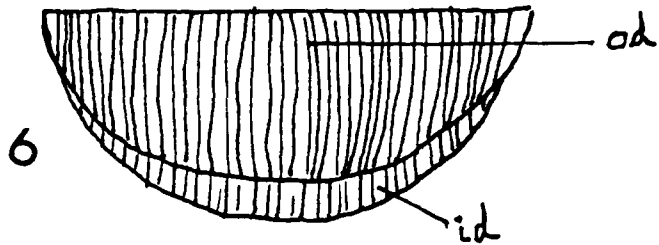


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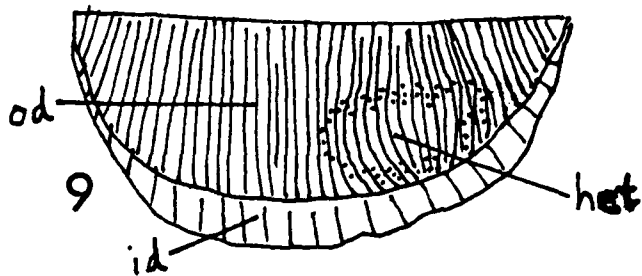
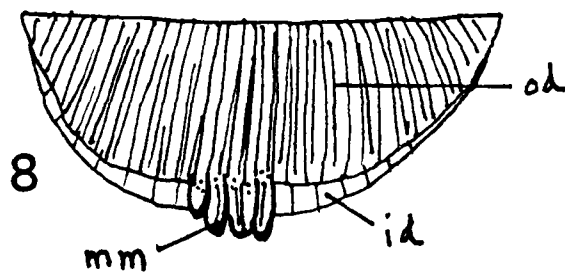
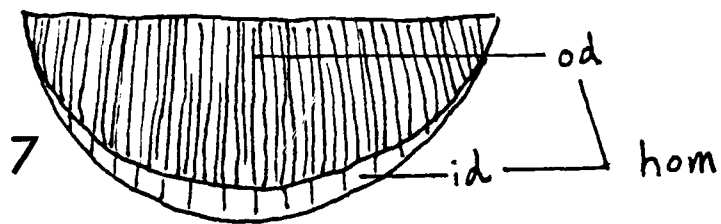


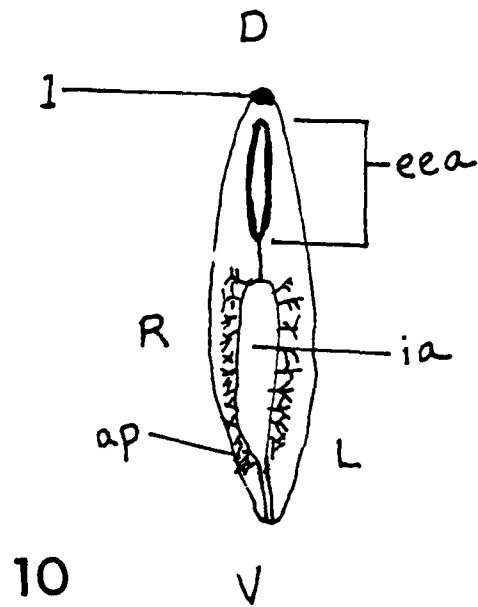
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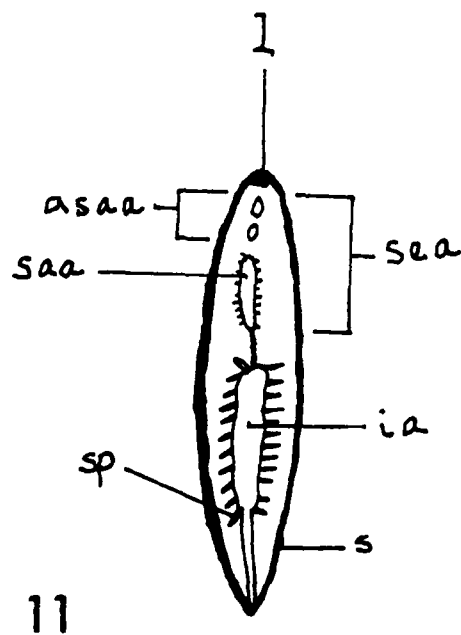


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Key to Recent Upper Mississippi River Species-Group Mussel Taxa

- 1a.        Incurrent papillae arborescent ..... 2
- b.        Incurrent papillae simple ..... 12
  
- 2a. (1a)    Excurrent aperture entire .. ..... 3
- b.        Excurrent aperture subdivided ..... 4
  
- 3a. (2a)    Shell subterete; adult shell growth without  
             sculpture (Exhibit 252) ..... *Cumberlandia monodonta*
- b.        Shell subrectangular or subcircular; sculpture  
             widespread, tubercular; beak sculpture neoteinic  
             (Exhibit 258) ..... *Cyclonaias tuberculata*
  
- 4a. (2b)    Adult shell growth without sculpture ..... 5
- b.        Adult shell growth sculpted ..... 7
  
- 5a. (4a)    Posterior ridge sharp (Exhibit 259) .. *Fusconaia flava*
- b.        Posterior ridge rounded ..... 6
  
- 6a. (5b)    Postbasal shell margin rounded (Exhibit 260) .....  
             ..... *Fusconaia ebena*
- b.        Postbasal shell margin pointed (Exhibit 264) .....  
             ..... *Pleurobema rubrum*
  
- 7a. (4b)    Sculpture confined to a radial row of knobs on the  
             disc (Exhibit 263) ..... *Plethobasus cyphus*
- b.        Disc without knobs; sculpture can occur anywhere  
             on adult shell growth ..... 8
  
- 8a. (7b)    Shell elongate (Exhibit 257) .... *Tritogonia verrucosa*
- b.        Shell subrectangular or subcircular ..... 9
  
- 9a. (8b)    Disc sulcate (Exhibit 254) ..... *Quadrula quadrula*
- b.        Disc not sulcate ..... 10

- 10a. (9b) Posterior ridge with knobs (Exhibit 253) .....  
..... *Quadrula metanevra*
- b. Shell without knobs ..... 11
- 11a. (10b) Shell sculpture chiefly confined to two radial  
rows of more or less lamellar tubercles, one on  
each of the anterior and posterior ridges; shell  
angular; no radial pigmentation (Exhibit 255) .....  
..... *Quadrula nodulata*
- b. Shell sculpture tubercular (rarely lamellar), not  
in rays, ranging from absent through covering  
entire shell; shell rounded; beaks pigmented in  
green rays (Exhibit 256) ..... *Q. pustulosa*
- 12a. (1b) Postbasal mantle margin papillose ..... 13
- b. Postbasal mantle margin without papillae ..... 31
- 13a. (12a) Adult shell growth sculpted ..... 14
- b. Adult shell growth without sculpture ..... 15
- 14a. (13a) Radial row of knobs on disc (Exhibit 267) .....  
..... *Obliquaria reflexa*
- b. Ribs on both sides of the lower posterior ridge  
(Exhibit 287) ..... *Plagiola triquetra*
- 15a. (13b) Postbasal mantle margin with special structure  
(caruncle or flap) ..... 16
- b. Postbasal mantle margin papillose and perhaps  
very broad, but without special structures ..... 20
- 16a. (15a) Caruncles present (Exhibit 282) .... *Carunculina parva*
- b. Flaps present ..... 17
- 17a. (16b) Beak sculpture several swollen concentric ridges  
(Exhibit 286) ..... *Lampsilis ovata ventricosa*
- b. Beak sculpture numerous low, oblique, interwoven  
ridges ..... 18

- 18a. (17b) Beak sculpture ridges long; shell subterete  
(Exhibit 283) ..... *Lampsilis teres*
- b. Beak sculpture ridges short; shell suboval or  
somewhat elongate ..... 19
- 19a. (18b) Entire mantle flap actively mobile; flap clearly  
pisciform (Exhibit 284) ..... *Lampsilis higginsii*
- b. Actively mobile part of flap a "ribbon" of tissue  
at anterior end; flap somewhat pisciform (Exhibit  
285) ..... *L. radiata siliquoides*
- 20a. (15b) Postbasal mantle margin comparatively broad ..... 21
- b. Postbasal mantle margin comparatively narrow ..... 22
- 21a. (20a) Shell subterete (Exhibit 280) ..... *Ligumia recta*
- b. Shell elongate (Exhibit 281) ..... *L. subrostrata*
- 22a. (20b) Periostracum with chevrons ..... 23
- b. Periostracum without chevrons ..... 25
- 23a. (22a) Posterior ridge rounded (Exhibit 276) .....  
..... *Truncilla donaciformis*
- b. Posterior ridge sharp ..... 24
- 24a. (23b) Sexual dimorphism expressed chiefly in shell  
outline (Exhibit 275) ..... *Truncilla truncata*
- b. Sexual dimorphism expressed chiefly in shell  
breadth (Exhibit 274) ..... *Ellipsaria lineolata*
- 25a. (22b) Shell alate ..... 26
- b. Shell without alae ..... 27
- 26a. (25a) Pseudosiphons ordinary (Exhibit 268) .. *Proptera alata*
- b. Pseudosiphons long (Exhibit 269) ..... *P. laevissima*

- 27a. (25b) Shell oviform (Exhibit 277) ..... *Obovaria olivaria*  
     b.       Shell otherwise ..... 28
- 28a. (27b) Beaks very high and inflated (Exhibit 270) .....  
             ..... *Proptera capax*  
     b.       Beaks neither very high nor very inflated ..... 29
- 29a. (28b) Shell inflated (Exhibit 271) ..... *Proptera purpurata*  
     b.       Shell compressed ..... 30
- 30a. (29b) Shell elongate (Exhibit 279) .....  
             ..... *Actinonaias ellipsiformis*  
     b.       Shell not elongate (Exhibit 278) ..... *A. carinata*
- 31a. (12b) Postbasal mantle margin comparatively broad ..... 32  
     b.       Postbasal mantle margin comparatively narrow ..... 33
- 32a. (31a) Shell strongly alate, weakly compressed (Exhibit  
             272) ..... *Leptodea fragilis*  
     b.       Shell weakly alate, very compressed (Exhibit  
             273) ..... *L. leptodon*
- 33a. (31b) Disc sculpted ..... 34  
     b.       Disc without sculpture ..... 37
- 34a. (33a) Shell alate (Exhibit 289) ..... *Lasmigona complanata*  
     b.       Shell without alae ..... 35
- 35a. (34b) Beak sculpture neoteinic ..... 36  
     b.       Beak sculpture not neoteinic (Exhibit 262) .....  
             ..... *Amblyma plicata*
- 36a. (35a) Beak sculpture two divergent rays of tubercles  
             (Exhibit 288) ..... *Arcidens confragosus*



- b. Beak sculpture an amorphous mass of tubercles  
(Exhibit 261) ..... *Megalonaia gigantea*
- 37a. (33b) Beaks low; dorsal shell margin straight ..... 38
- b. Beaks elevated; dorsal shell margin not straight .. 39
- 38a. (37a) Shell subcircular (Exhibit 296) .....  
..... *Anodonta suborbiculata*
- b. Shell elongate (Exhibit 297) ..... *A. imbecillis*
- 39a. (37b) Posterior slope sculpted ..... 40
- b. Posterior slope without sculpture ..... 43
- 40a. (39a) Posterior slope strongly sculpted (Exhibit 290) ...  
..... *Lasmigona costata*
- b. Posterior slope weakly sculpted ..... 41
- 41a. (40b) Posterior ridge rounded (Exhibit 299) .....  
..... *Strophitus undulatus*
- b. Posterior ridge sharp ..... 42
- 42a. (41b) Shell compressed, subquadrate (Exhibit 265) .....  
..... *Elliptio crassidens*
- b. Shell inflated, elongate (Exhibit 242) .....  
..... *Alasmidonta marginata*
- 43a. (39b) Shell subterete (Exhibit 266) ..... *Elliptio dilatata*
- b. Shell otherwise ..... 44
- 44a. (43b) Shell subquadrate (Exhibit 293) .. *Alasmidonta viridis*
- b. Shell elongate ..... 45
- 45a. (44b) Beak sculpture not double-looped (Exhibit 295) ....  
..... *Anodontoides ferussacianus*
- b. Beak sculpture double-looped ..... 46

- 46a. (45b) Beak sculpture weak (Exhibit 294) .....  
..... *Simpsoniconcha ambigua*
- b. Beak sculpture strong (Exhibit 298) .. *Anodonta grandis*

Exhibit 252

*Cumberlandia monodonta* (Say), Spectacle Case

Figure 1. Lateral view of outer surface of left valve  
(About 1.0x.) Note elongation.

Figure 2. Lateral view of inner surface of right valve.  
(About 1.0x.) Note the weak dentition.

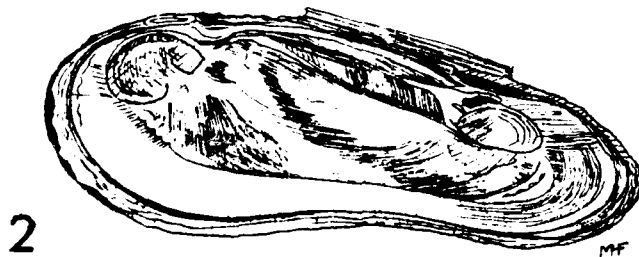
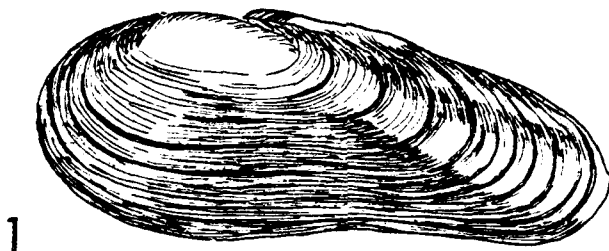
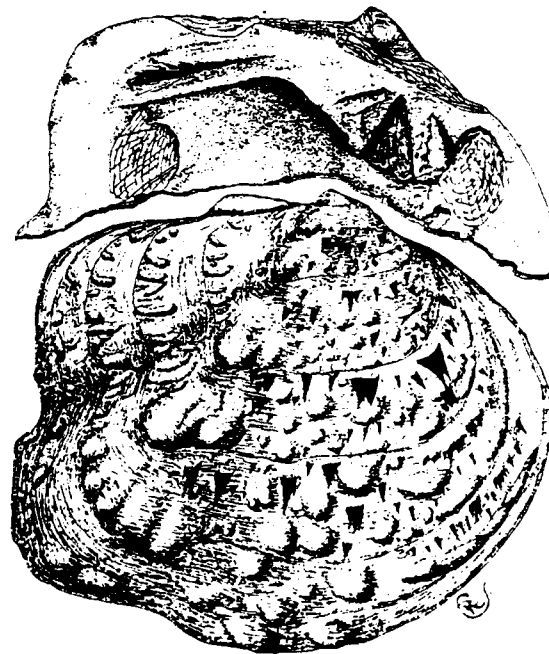
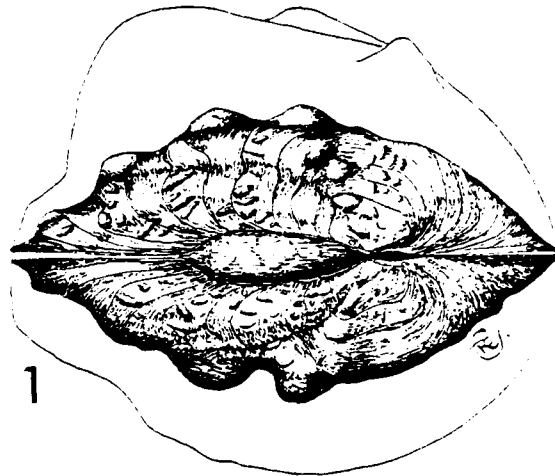


Exhibit 253

*Quadrula metaneura* (Rafinesque), Monkeyface

- Figure 1. Dorsal view and lateral outline. (About 1.0x.)
- Figure 2. Lateral views of (a) outer surface of right valve and (b) hinge of left valve. (About 1.0x.)
- Figure 3. Lateral view of outer surface of left valve of young adult. (About 2.0x.)
- Figure 4. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note emphasis on sculpture.
- Figure 5. Same as Figure 4. Note emphasis on pigmentation.



b

a

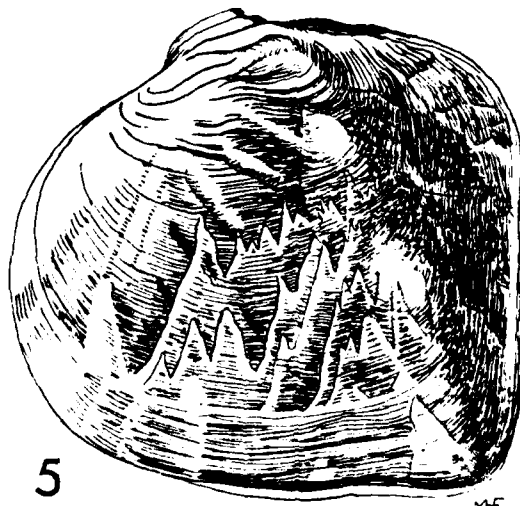
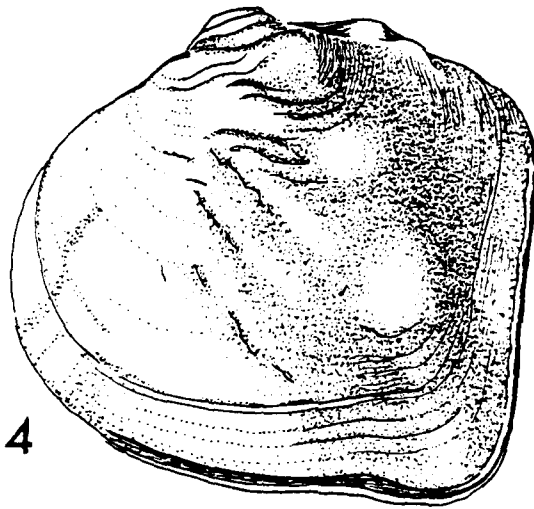
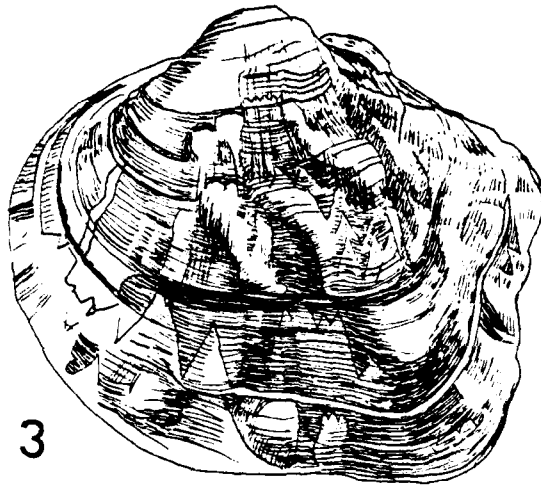


Exhibit 254

*Quadrula quadrula* Rafinesque, Mapleleaf

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note the two divergent radial rows  
of tubercles (arrows), the sulcus between them, the  
excavation of the shell margin at the base of the  
sulcus, and that the beak sculpture extends onto  
the disc.

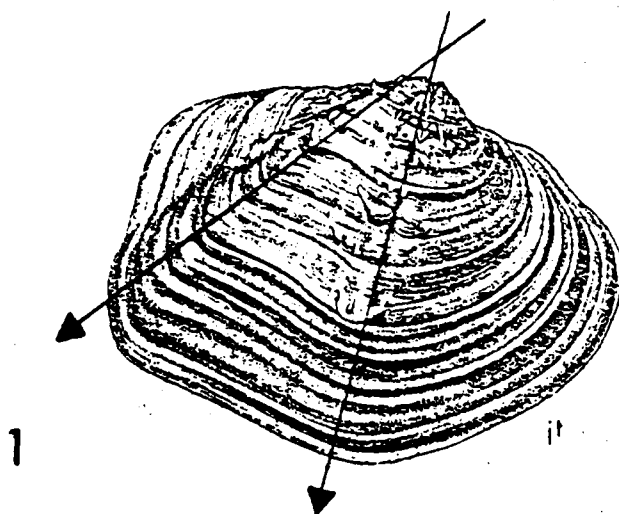
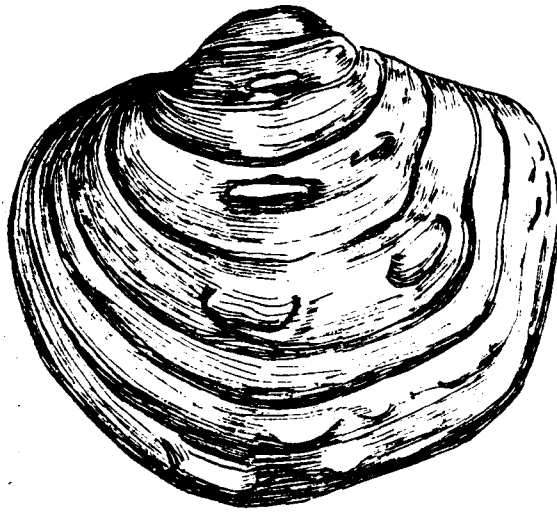


Exhibit 255

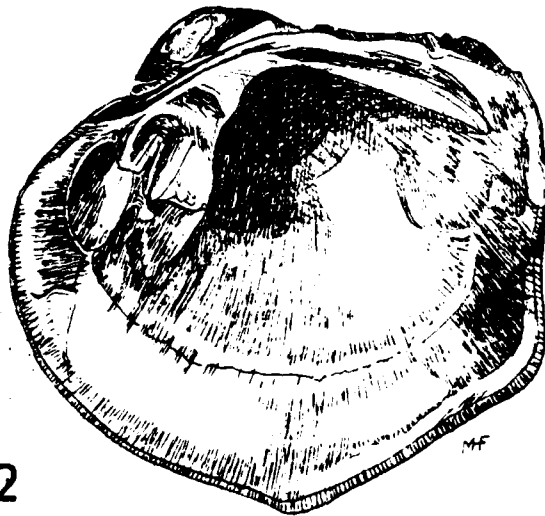
*Quadrula nodulata* (Rafinesque), Wartyback

- Figure 1. Lateral view of outer surface of left valve. (About 1.5x.) Note the two divergent radial rows of tubercles and the triangular outline of the postbasal margin.
- Figure 2. Lateral view of inner surface of right valve. (About 1.5x.)
- Figure 3. Dorsal view of juvenile. (About 4.0x.) Note beak sculpture, two divergent radial rows of tubercles extending onto disc.
- Figure 4. Posterior view of SAME.





1



2

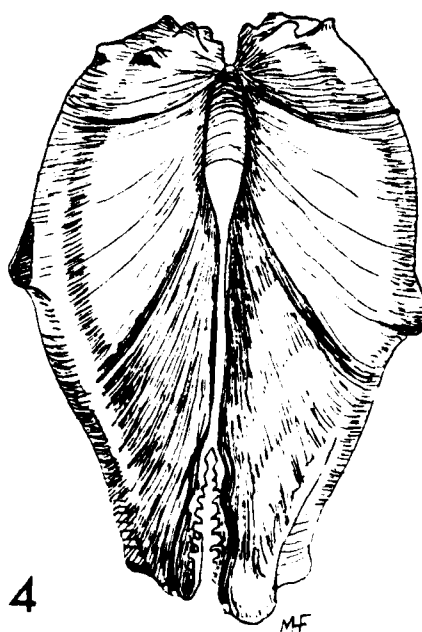
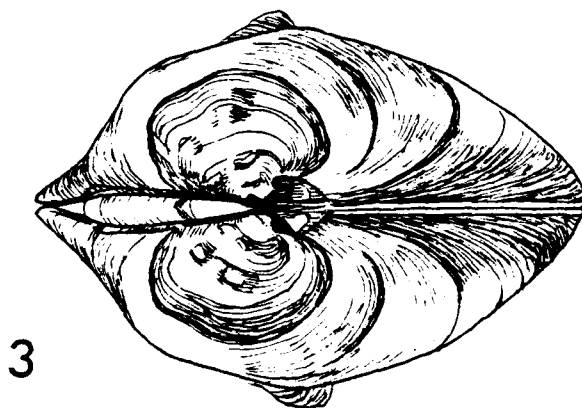
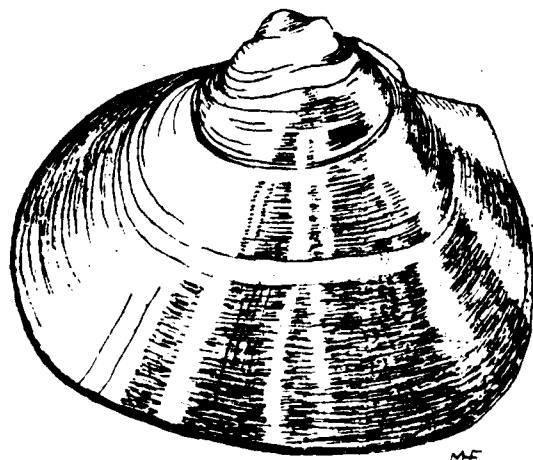
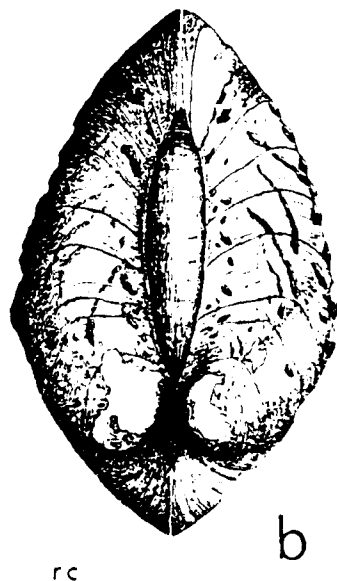
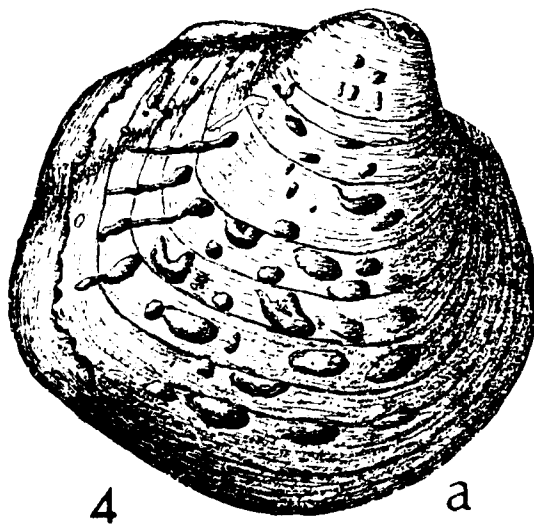
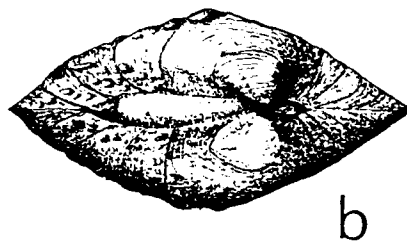
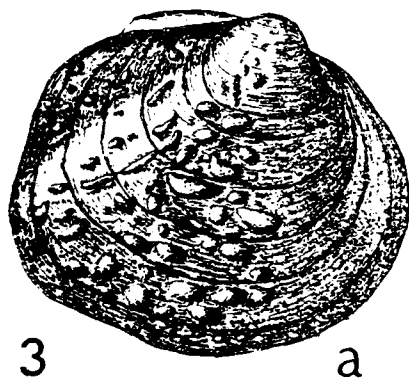
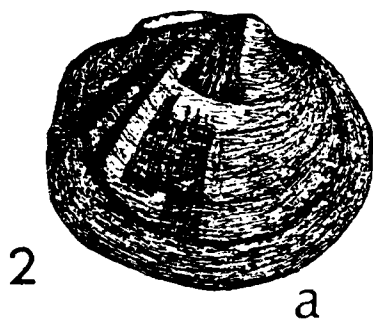


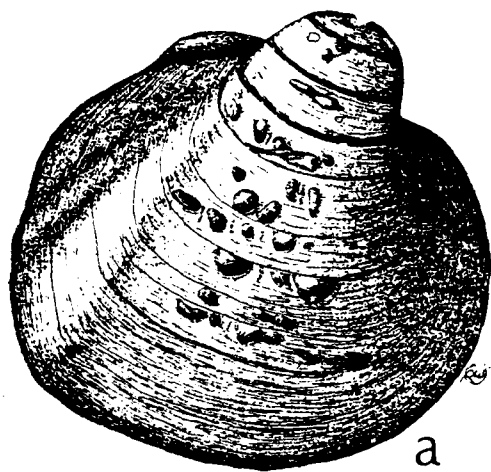
Exhibit 256

*Quadrula pustulosa* (Lea), Pimpleback

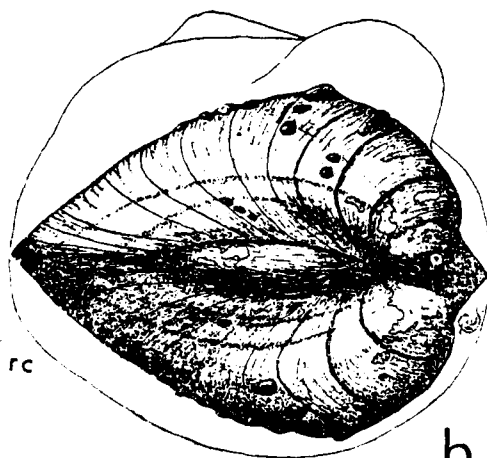
- Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note the beak sculpture, a few concentric ridges, and (see Figure 2a) the pigmented (green) umbonal rays.
- Figure 2. (a) Lateral view of outer surface of right valve of young adult. (About 1.0x.) Note umbonal rays (see Figure 1) and lack of sculpture (see Figure 6), which occasionally occurs in *Q. pustulosa*. (b) Dorsal view of SAME.
- Figures 3, 4, 7, and 8. (a) Lateral view of outer surface of right valve. (b) Dorsal view. (About 1.0x.) Note the sculpture patterns exhibited by this highly variable species (see Figures 5, 6, 11, and 12).
- Figure 5. (a) Lateral view of outer surface of right valve. (b) Dorsal view and lateral outline from the right. (About 1.0x.)
- Figure 6. (a) Lateral view of outer surface of right valve. (b) Dorsal view emphasizing growth lines. (About 1.0x.) Note the umbo, naturally low even though eroded (contrast with Figure 5).
- Figures 9 and 10. Growth series of lateral outlines of right valve. (About 1.0x.)
- Figures 11 and 12. Dorsal view and lateral outline from the right. (About 1.0x.) Note the differences in inflation.







5

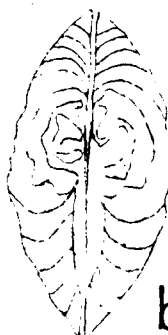


b

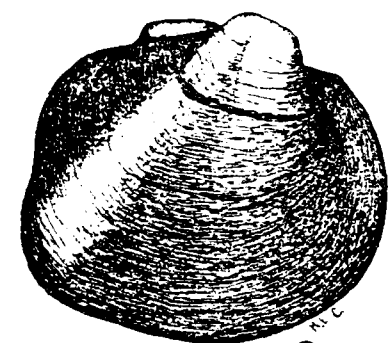


6

a

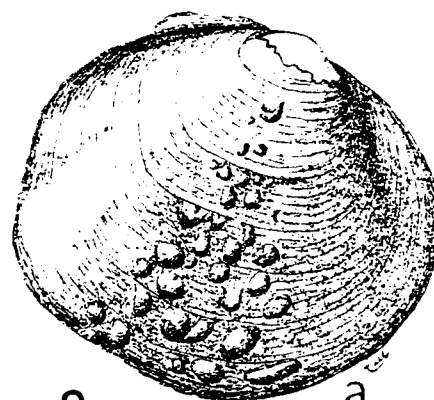


b



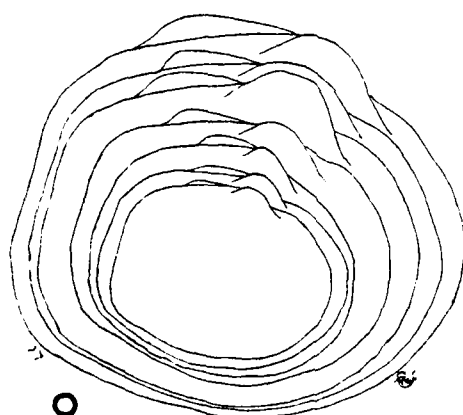
7

a



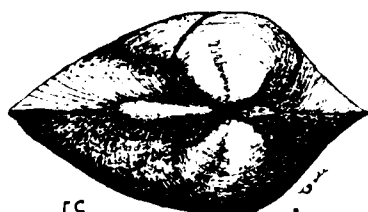
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a



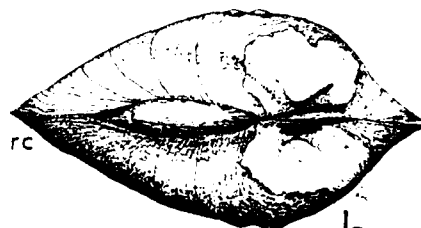
9

rc



rc

b



rc

b

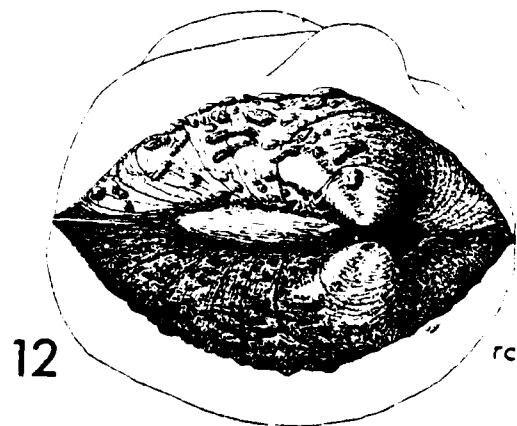
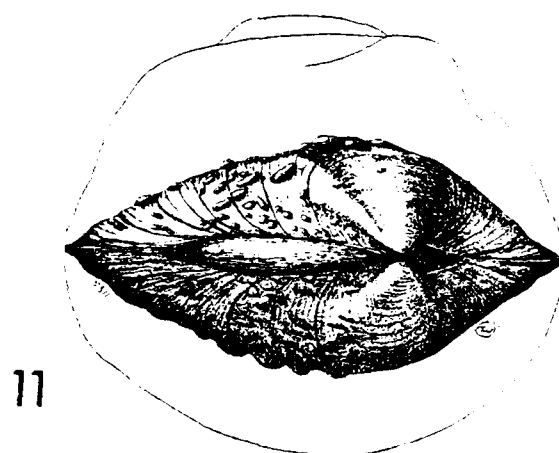
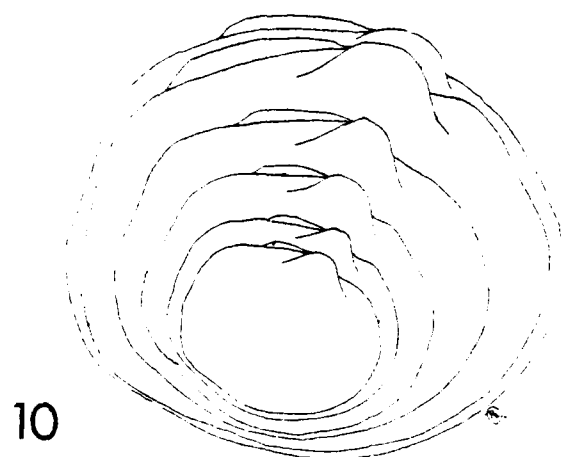
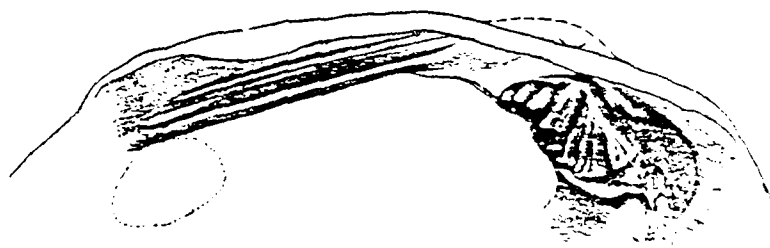
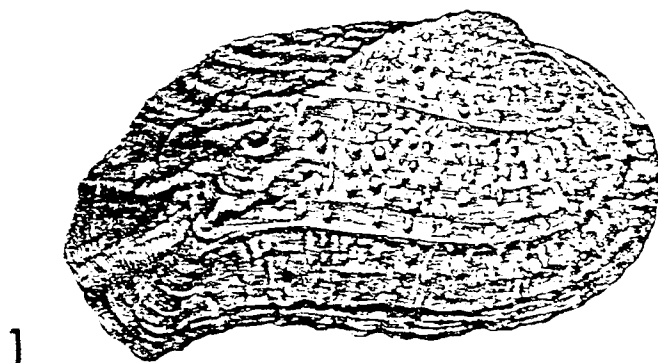


Exhibit 257

*Pectogonia verrucosa* (Rafinesque), Buckhorn

Figure 1. Lateral view of outer surface of right valve of female. (About 1.0x.) Note the arcuate, hook-like expansion of the postbasal area (the male lacks this feature and is obliquely truncate postbasally).

Figure 2. Lateral view of hinge of left valve (About 1.0x.)





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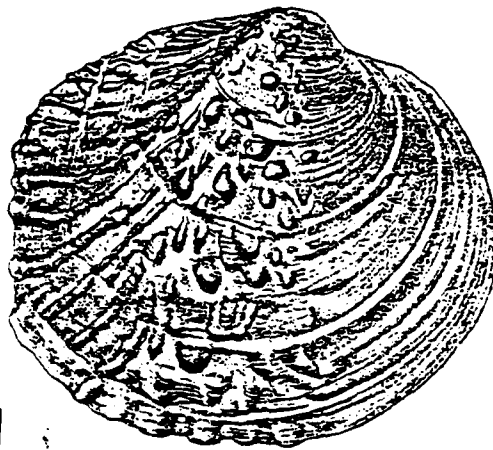
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Exhibit 258

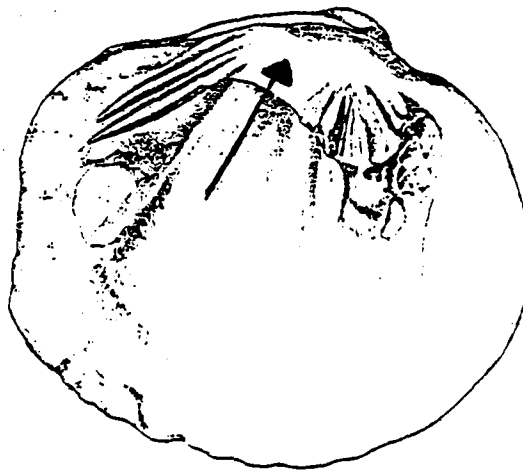
*Cyclonaias tuberculata* (Rafinesque), Purple Pimpleback

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.)

Figure 2. Lateral view of inner surface of left valve.  
(About 1.0x.) Note broad interdentum (arrow)  
and massive hinge plate and dentition.



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Exhibit 259

*Fusconia flava* (Rafinesque), Pigtoe

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, a few concentric ridges, and the lack of umbonal pigment (compare Exhibit 256, Figure 1).

Figures 2 and 3. Lateral view of outer surface of left valve (About 1.0x.) Note the sharper postbasal point of the younger shell (Figure 2).

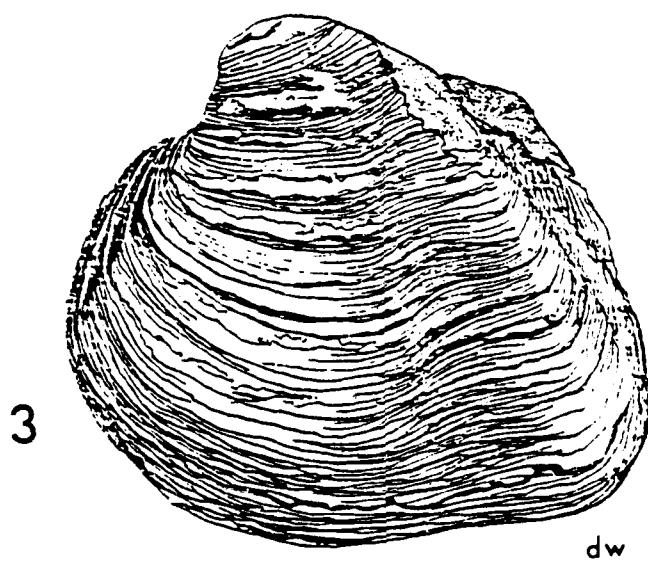
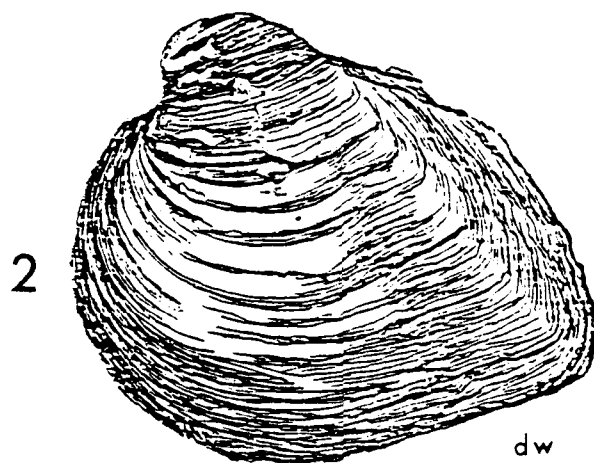
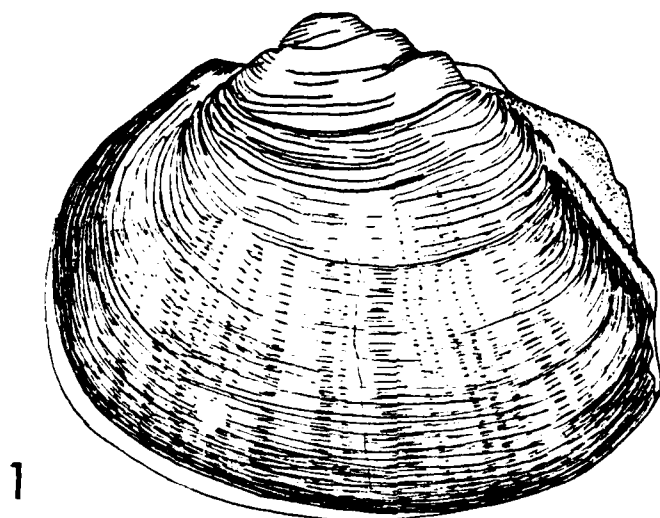


Exhibit 260

*Fusconaia ebena* (Lea), Ebony Shell

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note the rounded ventral and post-  
basal margins and that the beak curves anteriad.

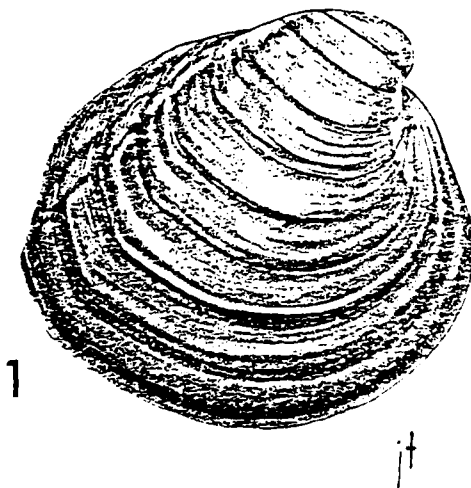


Exhibit 261

*Megalonaias gigantea* (Barnes), Washboard

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note that the upper disc is sculpted  
(contrast Exhibit 262, Figure 3) and that the sculpture  
is an extension of that on the beak.

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)

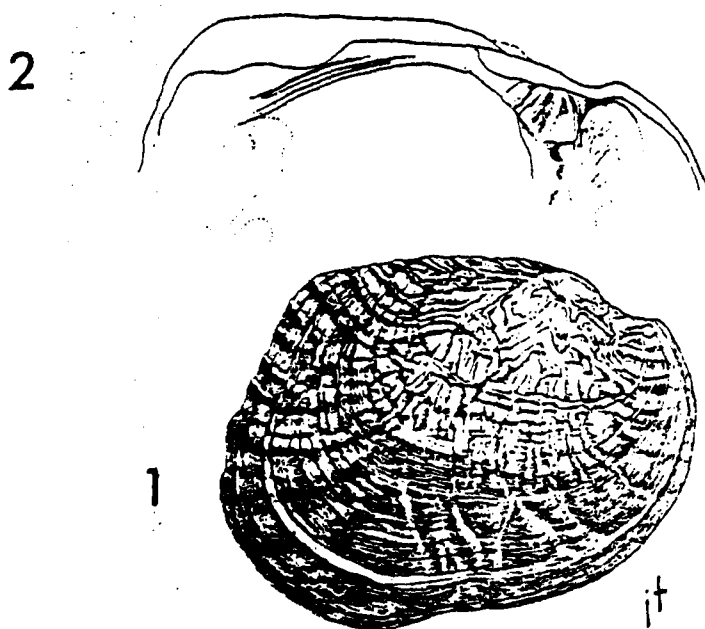


Exhibit 262

*Amblyma plicata* (Say), Threeridge

- Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, several rather sharp concentric ridges (contrast Exhibits 256 and 259, Figure 1), and the pigmented (green) rays on the posterior ridge and slope, which usually are lost in the adult (see Figure 2).
- Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note that sculpture on upper disc is not umbonal in character (contrast Exhibit 261, Figure 1).
- Figure 3. Lateral view of hinge of left valve. (About 1.0x.)

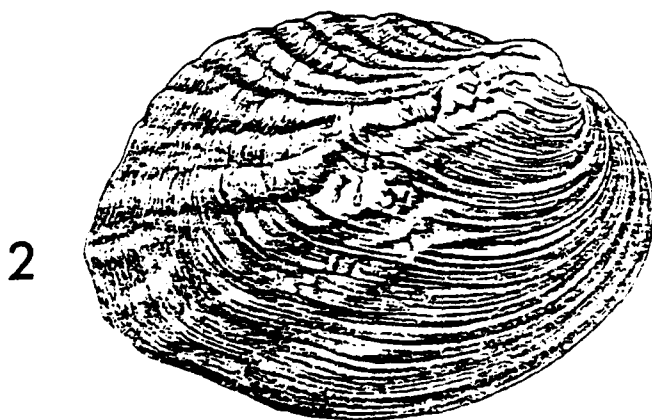
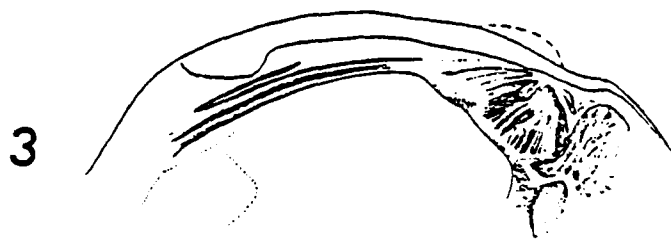
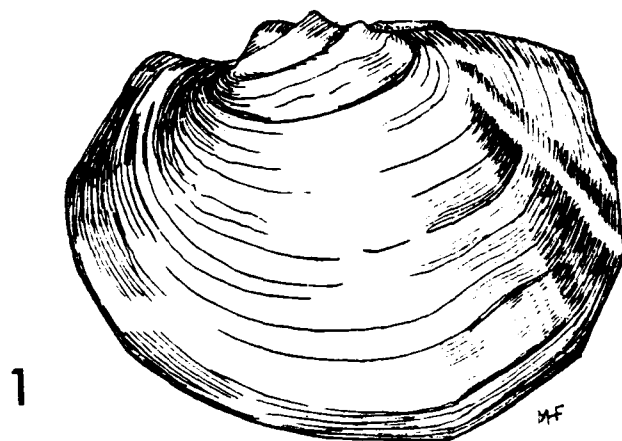




Exhibit 263

*Plethobasus cyphus* (Rafinesque), Bullhead

- Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Note triangular outline of post-basal margin (arrows) and see annotation of couplet-choice 7a (above).
- Figure 2. Lateral view of hinge of left valve. (About 1.0x.) Note heavy dentition.

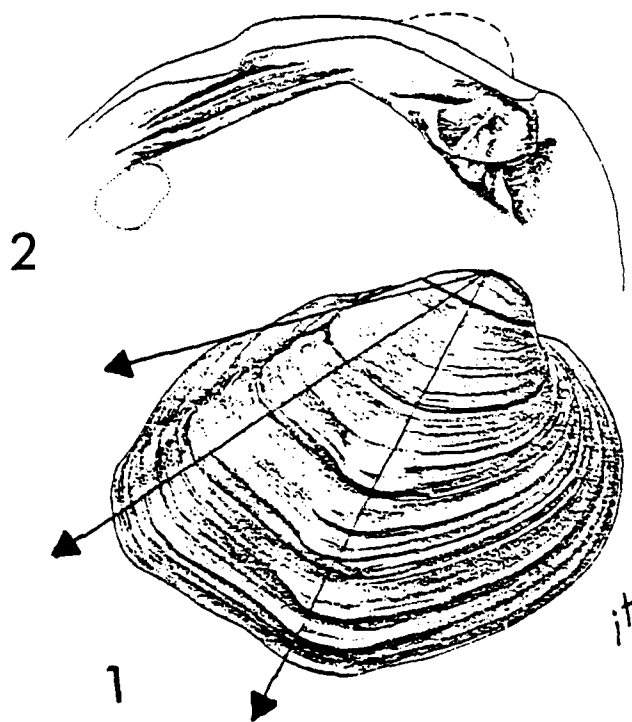
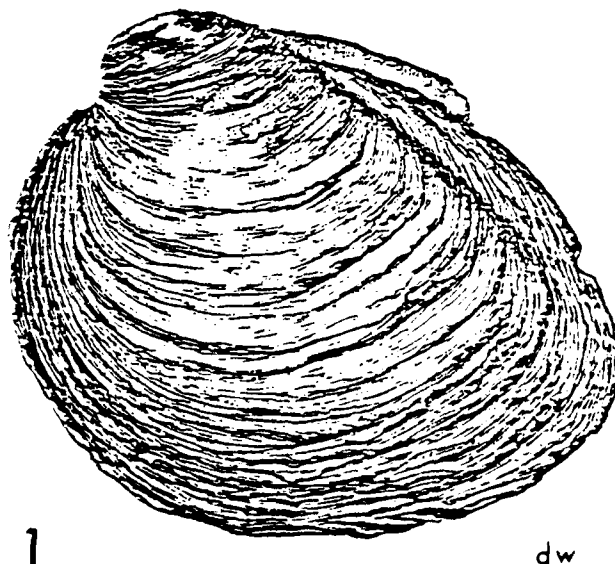
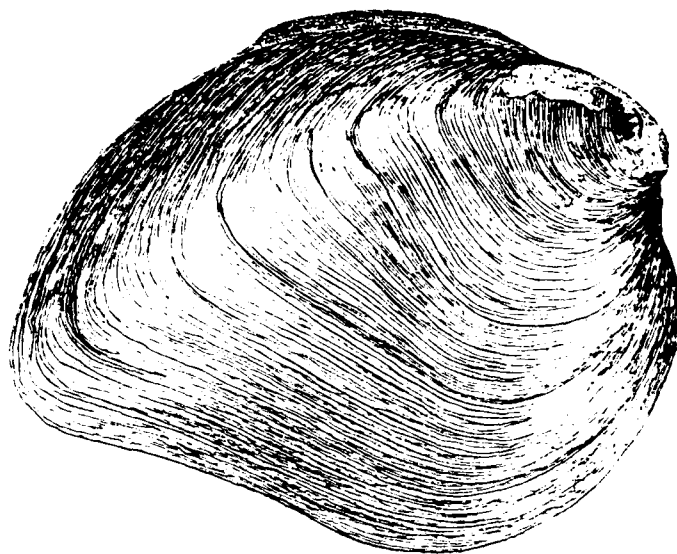


Exhibit 264

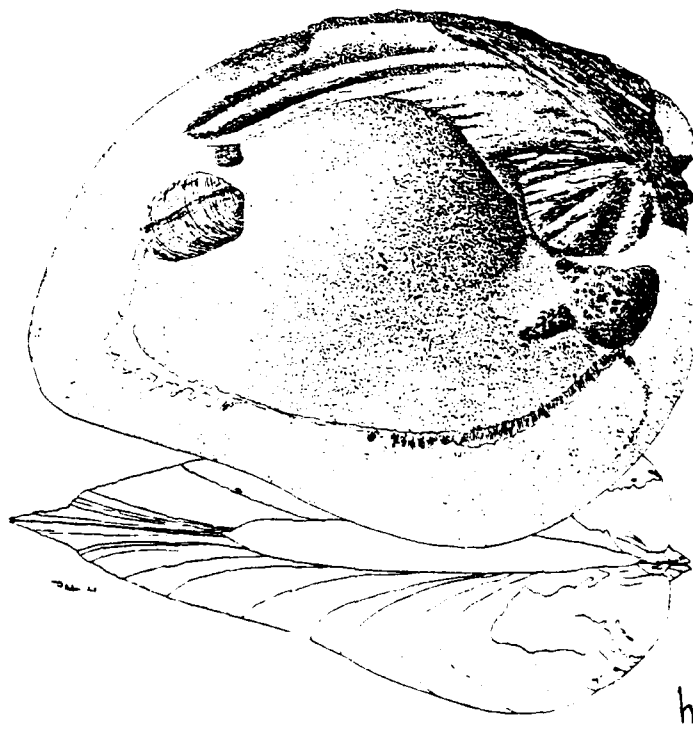
*Pleurobema rubrum* (Rafinesque), Pink Pigtoe

- Figure 1. Lateral view of outer surface of left valve. (About 1.0x.) Note the pointed postbasal margin and the rounded posterior ridge (contrast Exhibits 259 and 260, Figures 2 and 3 and Figure 1, respectively). This figure illustrates the *P. rubrum* morph that is usually encountered in the UMR today.
- Figure 2. (a) Lateral view of outer surface of right valve. Note pointed postbasal margin and somewhat arcuate outline. (About 1.0x.) (b) Lateral view of inner surface of left valve. (About 1.0x.) Note heavy dentition. (c) Partial dorsal view emphasizing growth lines. Note laterally compressed posterior (left) outline. This figure illustrates another of the several morphs of *P. rubrum*; this one is rarely found in the UMR any longer.





a



b

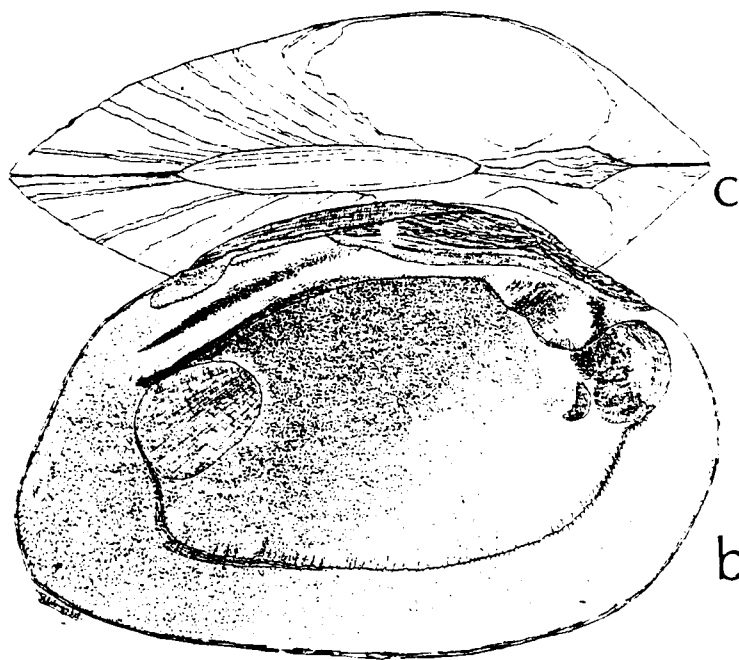
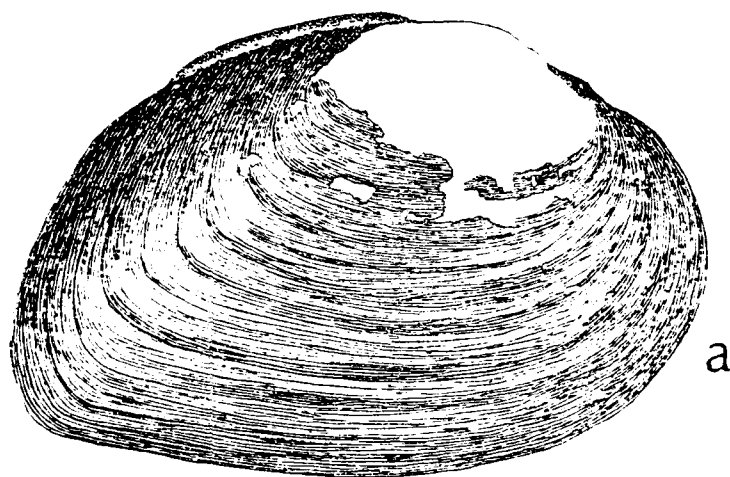
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Exhibit 265

*Elliptio crassidens* (Lamarck), Elephant Ear

Figure 1. (a) Lateral view of outer surface of right valve. (About 1.0x.) (b) Lateral view of inner surface of left valve. Note that, although this is a large and heavy shell, the dentition is weak in comparison to those shown in most previous Exhibits. (c) Partial dorsal view emphasizing growth lines.



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Exhibit 266

*Elliptio dilatata* (Rafinesque), Spike

- Figure 1. Lateral view of outer surface of right valve. (About 1.0x.) Most *E. dilatata* from the UMR today are more nearly dagger-shaped.
- Figure 2. Ventral view of posterior end of whole animal preserved in lifelike aspect. (About 4.0x.) Note the narrow, apapillose apposing postbasal mantle margins (oblique arrows) and the distal (ventral) margins of the inner demibranchs of the gills (vertical arrows), which exhibit partitioning into water tubes. Contrast this figure to, e.g., Exhibit 280, Figures 4 and 5.

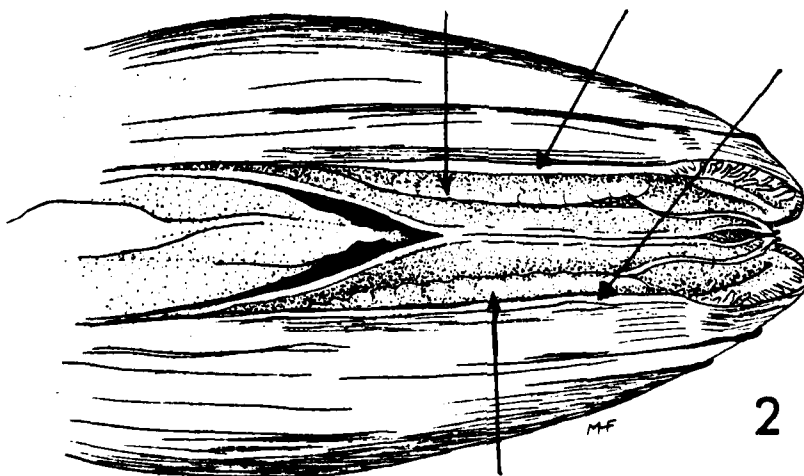
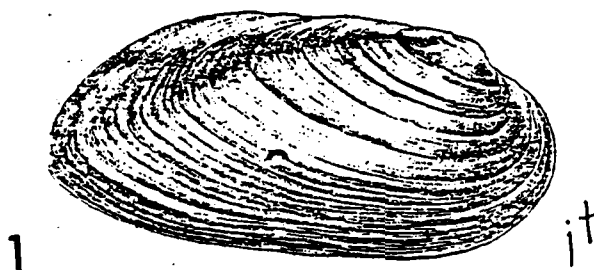
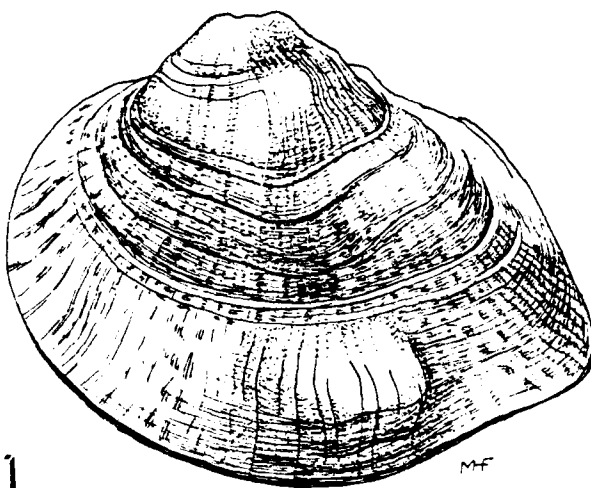


Exhibit 267

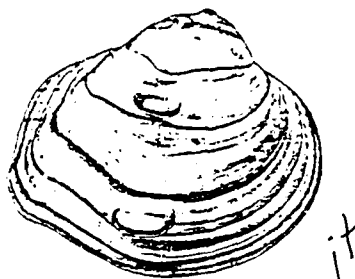
*Obliquaria reflexa* (Rafinesque), Threehorn

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 6.0x.)

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note radial row of knobs on disc, which perpetuate the beak sculpture (see Figure 1).



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Exhibit 268

*Proptera alata* (Say), Pink Heelsplitter

- Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note the unsculpted posterior slope and the lack of periostracal "scratches" on the disc (contrast Exhibit 289). Note, also, the weak (in this specimen, absent) anterior ala ("wing") (arrow) (contrast Exhibit 269 and Exhibit 272, Figures 2 and 3).
- Figure 2. Lateral view of inner surface of left valve.  
(About 1.0x.) Note the weak pseudocardinal teeth. The broken row of open subrectangles (arrow) above the lateral teeth indicates where the ligament broke when the valves were parted.

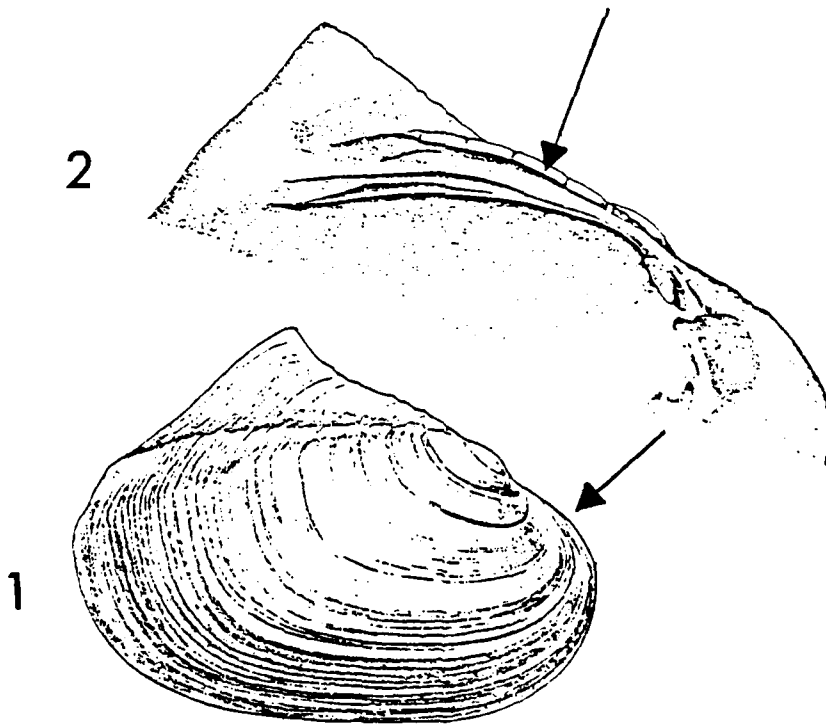
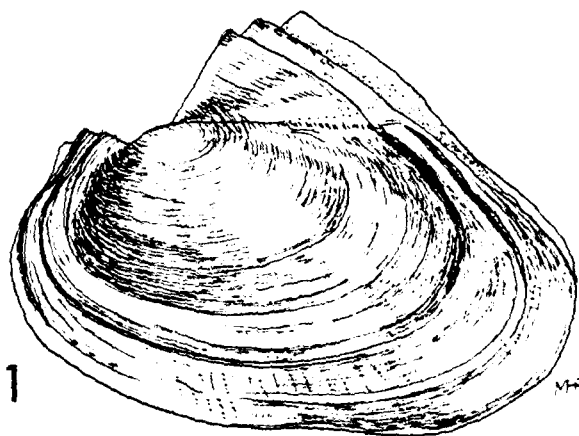




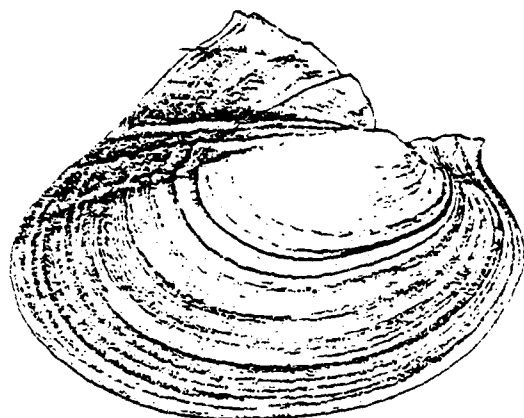
Exhibit 269

*Proptera laevissima* (Lea), Pink Papershell

- Figure 1. Lateral view of outer surface of left valve.  
(About 1.0x.) Note the strong bi-alation (contrast Exhibits 268, 272, and 289, Figure 1a) and that the dorsal margins of the alae ("wings") are almost perpendicular to one another. (Contrast Exhibit 272, Figures 2 and 3).
- Figure 2. SAME, but right valve.
- Figure 3. Left lateral view of animal with foot (i) and pseudo-siphons (ii) extended. Note the length of the latter structures.



2



3

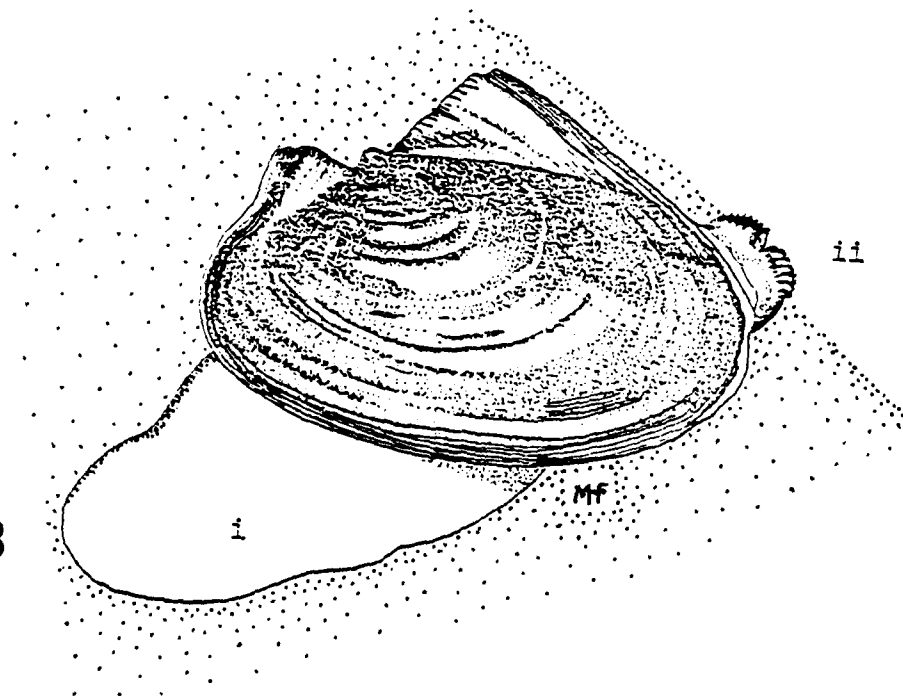
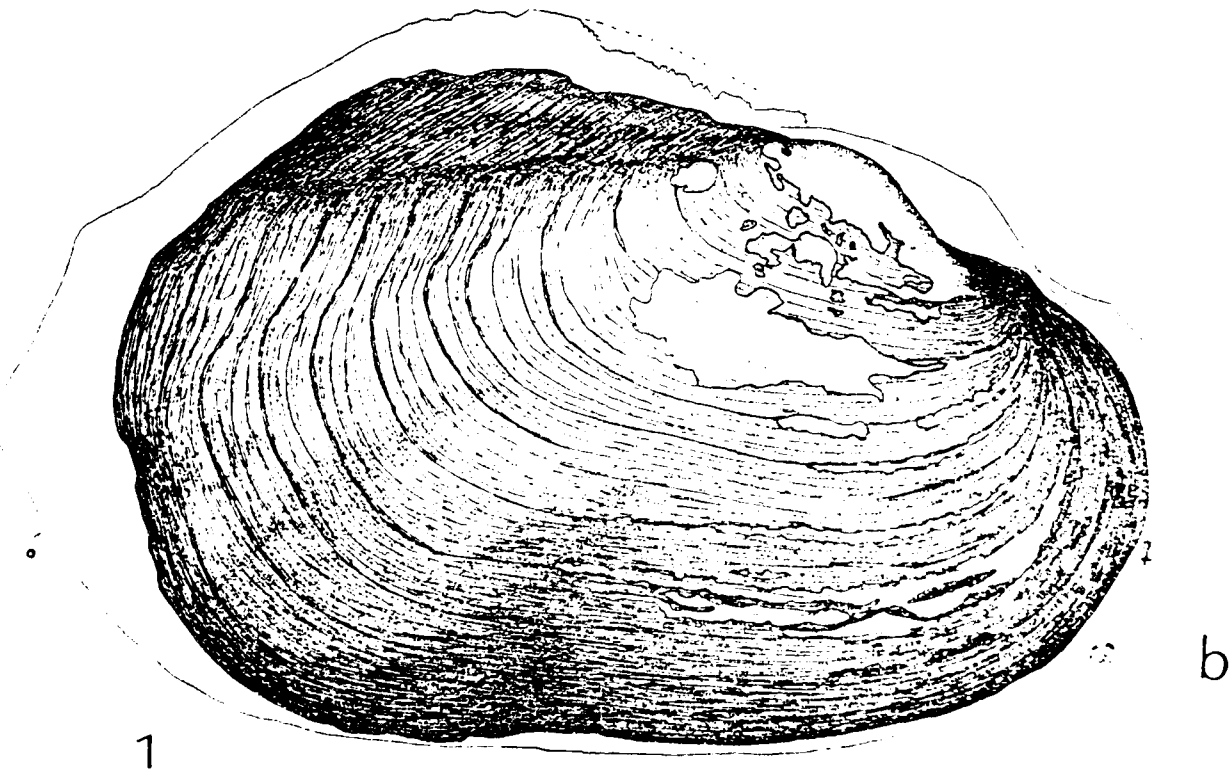


Exhibit 270

*Proptera purpurata* (Lamarck), Purple Pocketbook

Figure 1. (a) Dorsal view. (About 1.0x.) Note inflation.  
(b) Lateral view of outer surface of right valve of female and lateral outline of male right valve. (About 1.0x.) Note the lack of alae (contrast Exhibits 268, 269, and 289, Figure 1a) and the difference between the male ( $\sigma$ ) and female ( $\varphi$ ) outlines.



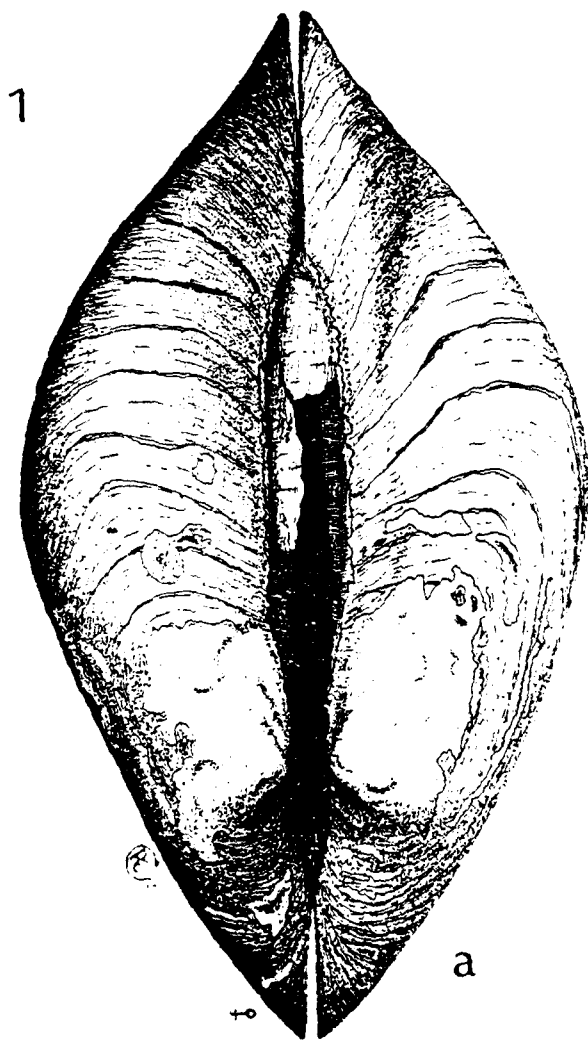
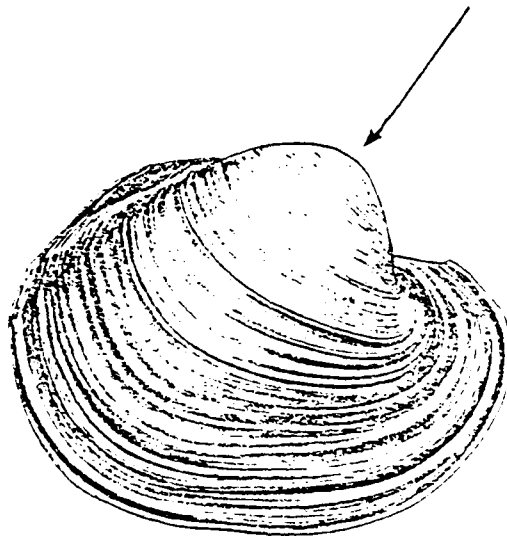


Exhibit 271

*Proptera sapax* (Green), Fat Pocketbook

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note the elevated and swollen umbo  
(arrow).



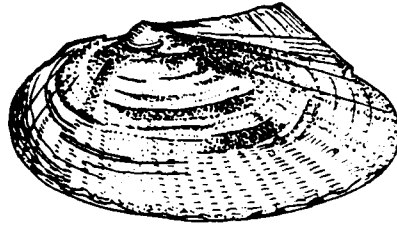
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Exhibit 272

*Leptodea fragilis* (Rafinesque), Fragile Papershell

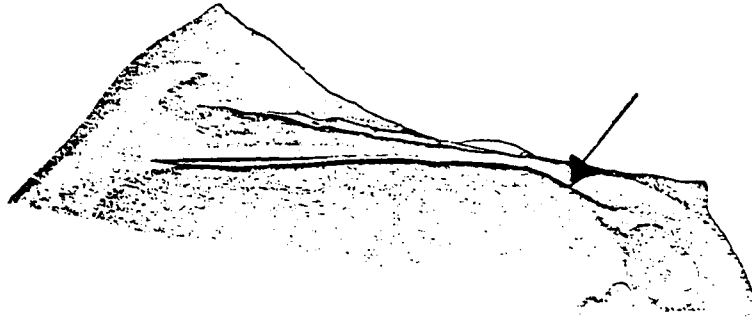
- Figure 1. Lateral view of outer surface of left valve of juvenile. (About 3.0x.) Note lack of beak sculpture.
- Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note the strong posterior (left) ala and weak anterior (right) one (contrast Exhibits 268, 269, 273, and 289, Figure 1a).
- Figure 3. Lateral view of inner surface of left valve. (About 1.0x.) Note weak pseudocardinal dentition (arrow), and contrast Exhibit 268, Figure 2.

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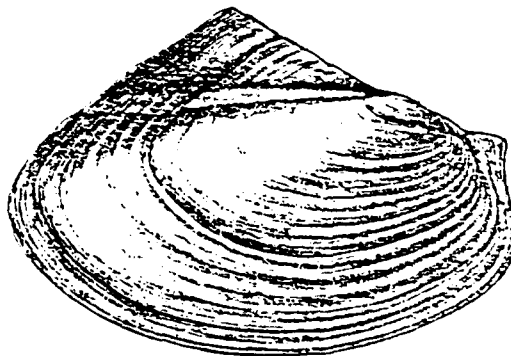


Exhibit 273

*Leptodea leptodon* (Rafinesque), Narrow Papershell

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note the lack of bi-alation and  
the weak posterior ala (arrow) (contrast Exhibit 272).

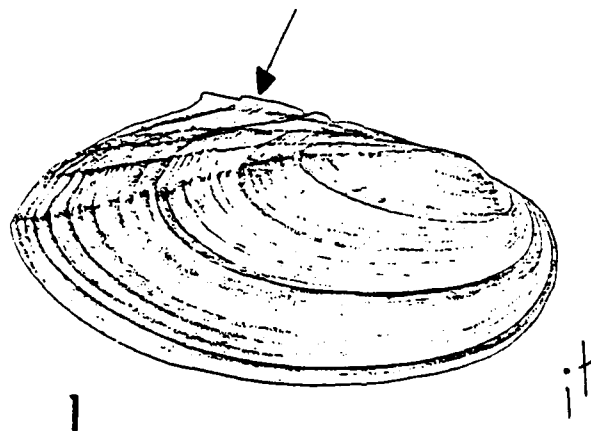




Exhibit 274

*Ellipsaria lineolata* (Rafinesque), Butterfly

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note the radial rows of pigmented  
chevrons.

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)

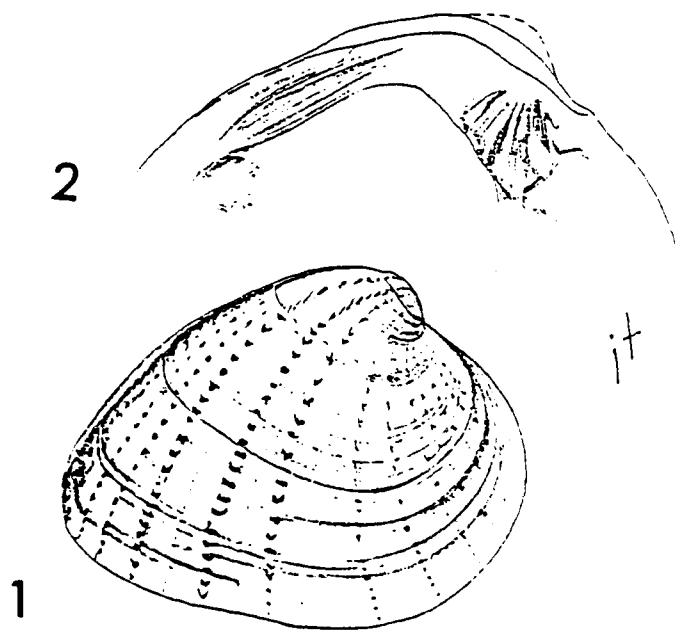
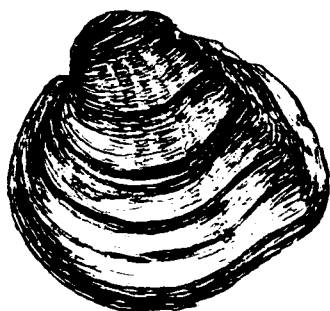


Exhibit 275

*Truncilla truncata* (Rafinesque), Deertoe

Figure 1. Lateral view of outer surface of left valve of male. (About 1.0x.) The postbasal margin of the female is more rostrate. This figure is of a specimen lacking the radial rows of pigmented chevrons that commonly occur in this species.



1

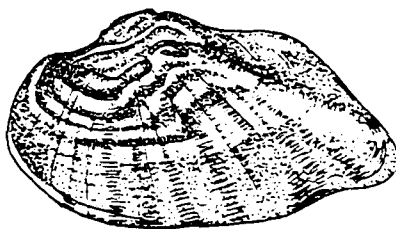
13

Exhibit 276

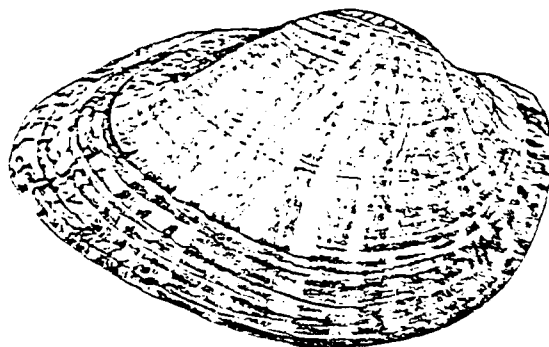
*Truncilla donaciformis* (Lea), Fawnfoot

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note the beak sculpture, numerous non-concentric wavy ridges.

Figure 2. Lateral view of outer surface of right valve of male (About 1.5x.) Note the radial rows of pigmented chevrons. The female is much higher posteriorly.



1

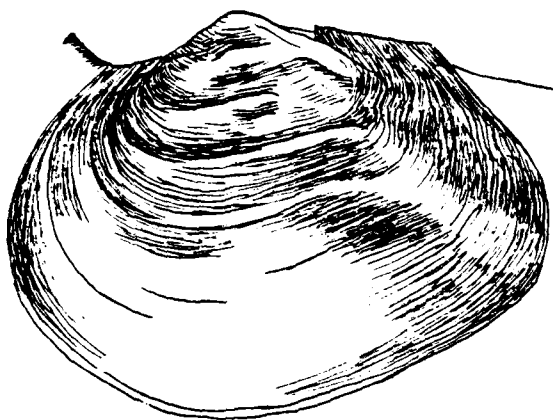


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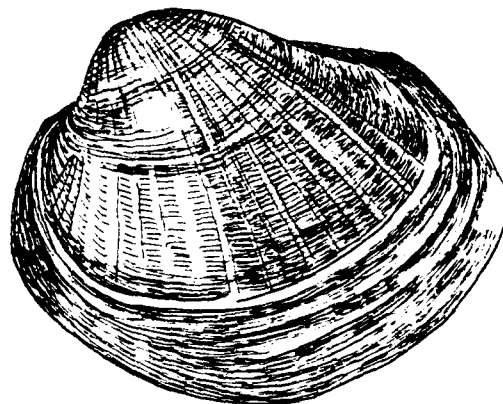
Exhibit 277

*Obovaria olivaria* (Rafinesque), Hickorynut

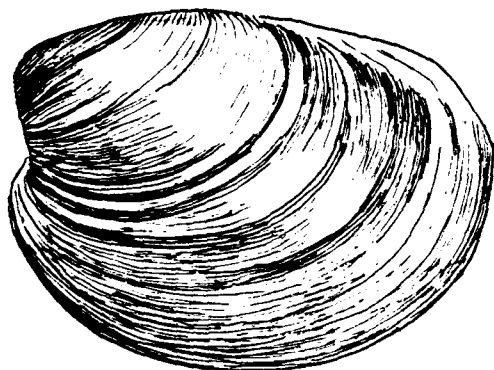
- Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note the beak sculpture, several weak non-concentric ridges (contrast Exhibit 284, Figure 1).
- Figure 2. Lateral view of outer surface of left valve of young adult. (About 2.0x.) Note radial raised lines on periostracum.
- Figure 3. Lateral view of outer surface of left valve. (About 1.0x.) Note elongate-oval outline and prominent, somewhat pointed umbo (contrast Exhibit 284, Figures 4 and 7).
- Figure 4. Lateral view of inner surface of right valve. (About 1.0x.) Contrast Exhibit 284, Figures 5 and 8.
- Figure 5. SAME, but hinge only. (About 2.0x.) Note lamella (lower arrow) below lateral tooth (upper arrow), and compare with Exhibit 284, Figure 6.



1



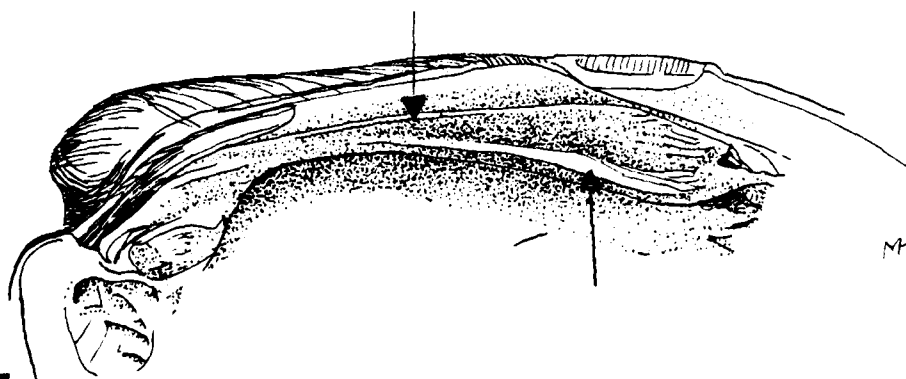
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Exhibit 278

*Actinonaias carinata* (Barnes), Mucket

- Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note the lack of beak sculpture, and contrast Exhibits 277 and 284, Figure 1.
- Figure 2. Lateral view of outer surface of right valve of female. (About 1.0x.) The male is somewhat less high posteriorly; conchological sexual dimorphism occurs in *Actinonaias*, but is weakly expressed.
- Figure 3. Lateral view of hinge of left valve. (About 1.0x.)

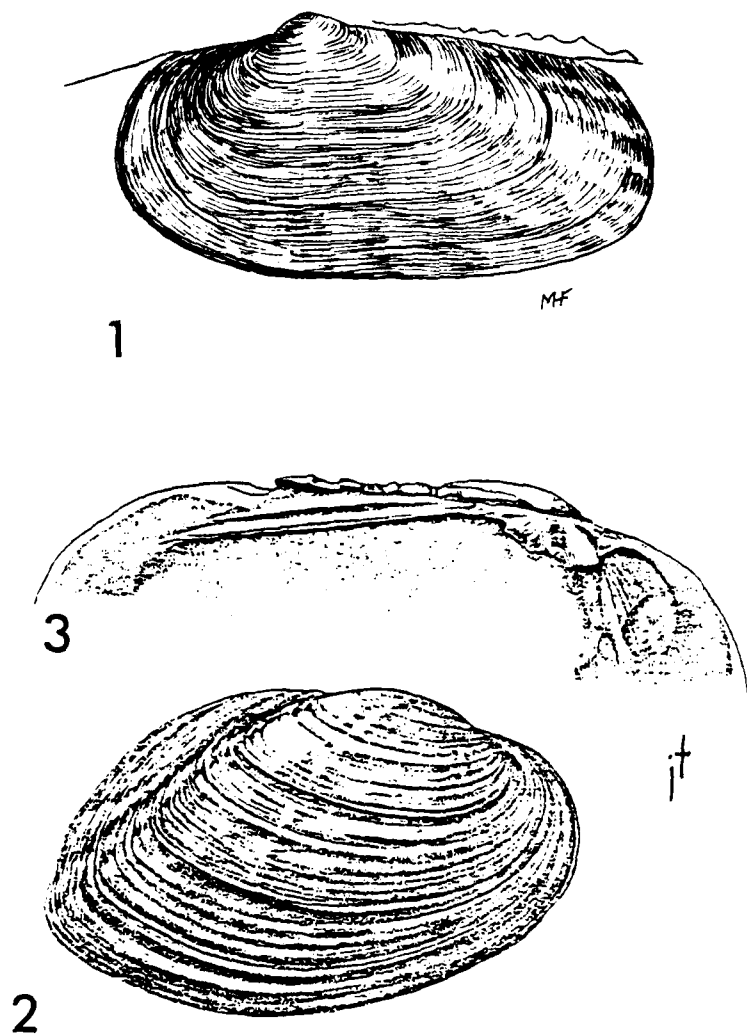
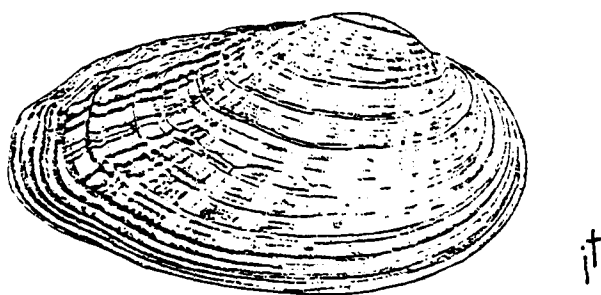


Exhibit 279

*Actinonaias ellipsiformis* (Conrad), Ellipse

Figure 1. Lateral view of outer surface of right valve.  
(About 1.5x.) Contrast Exhibit 278, Figure 2.



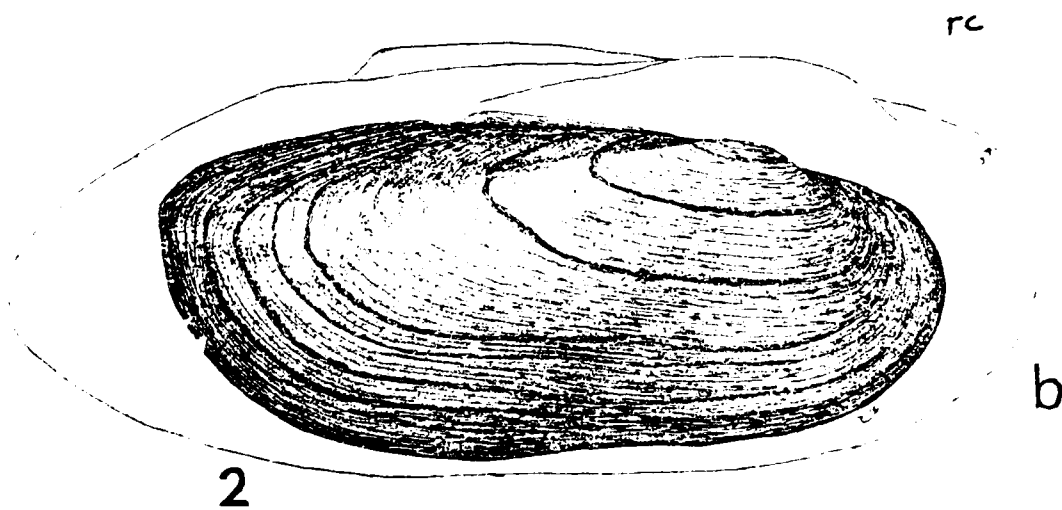
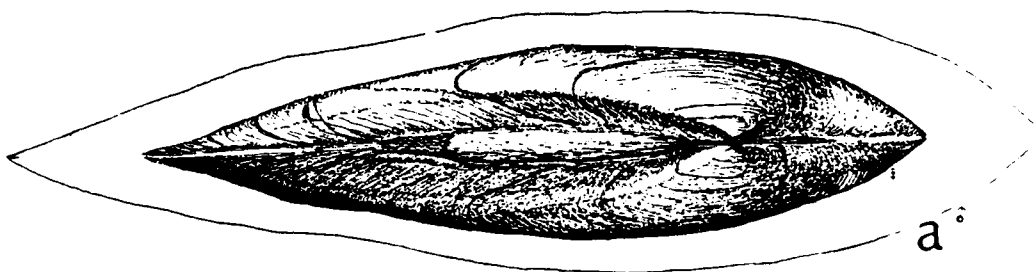
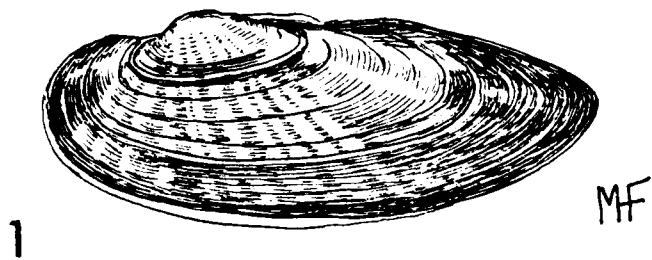
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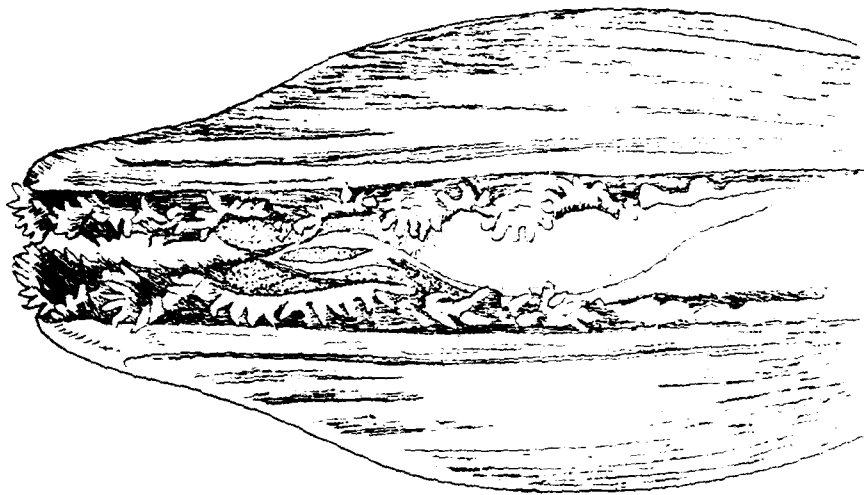
Exhibit 280

*Ligumia recta* (Lamarck), Black Sandshell

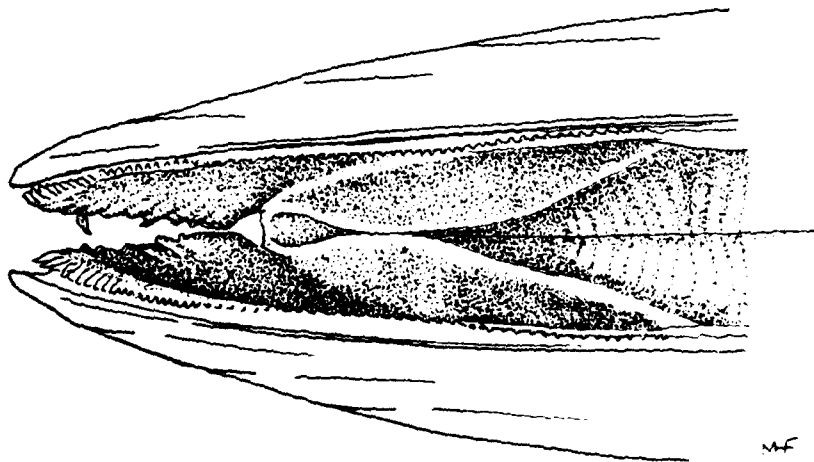
- Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note lack of beak sculpture (contrast Exhibit 283, Figure 1).
- Figure 2. (a) Dorsal view of female and dorsal outline of male. (About 1.0x.) Note the lateral compression of both sexes. (b) Lateral view of outer surface of right valve of female and right lateral outline of male. (About 1.0x.) Note the nearly dagger-like shape of the male. Compare the lateral view of the female to Exhibit 281.
- Figure 3. (a) Ventral view of posterior end of male preserved in almost lifelike aspect. (About 2.5x.) Note the small papillae on the apposing postbasal mantle margins. (b) Ventral view of posterior end of female preserved in almost lifelike aspect (About 2.5x.) Note the large papillae on the apposing postbasal mantle margins and the latter's breadth.







3



a

Exhibit 281

*Ligumia subrostrata* (Say), Western Pondmussel

Figure 1. Lateral view of outer surface of right valve of female. (About 1.0x.) Compare non-outline portion of Figure 2b, Exhibit 280. Male left lateral outline resembles that of Figure 1, Exhibit 280.

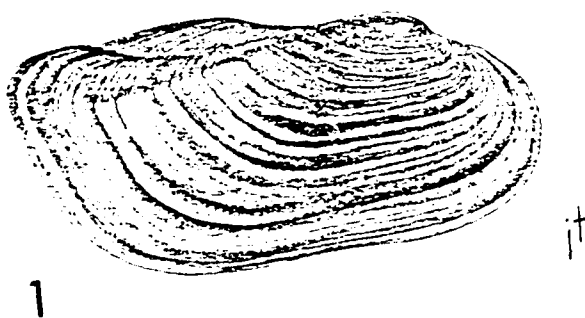
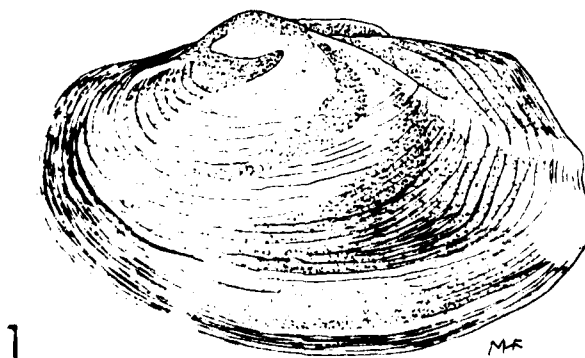


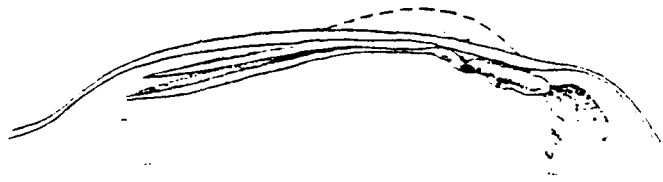
Exhibit 282

*Carunculina parva* (Barnes), Lilliput

- Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, several prominent ridges about 45° oblique to the growth lines.
- Figure 2. Lateral view of outer surface of right valve of male. (About 3.0x.) The female shell is extended postbasad.
- Figure 3. Lateral view of hinge in left valve. (About 3.0x.)
- Figure 4. Ventral view of posterior end of (a) male and (b) female animals preserved in lifelike aspect. Note the apposing, female caruncles (arrows); the greater breadth of the female's postbasal mantle margins; and that papillation of those margins extends farther anteriad in the male.

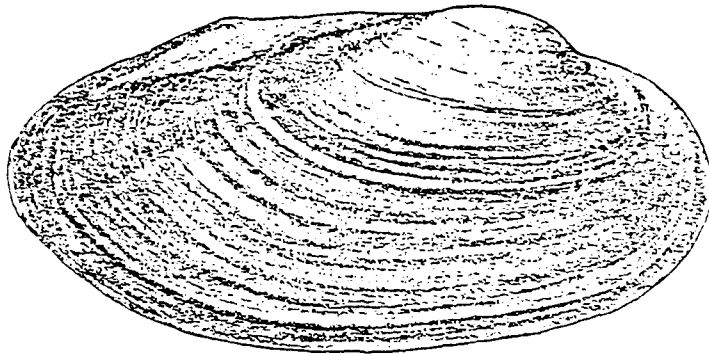


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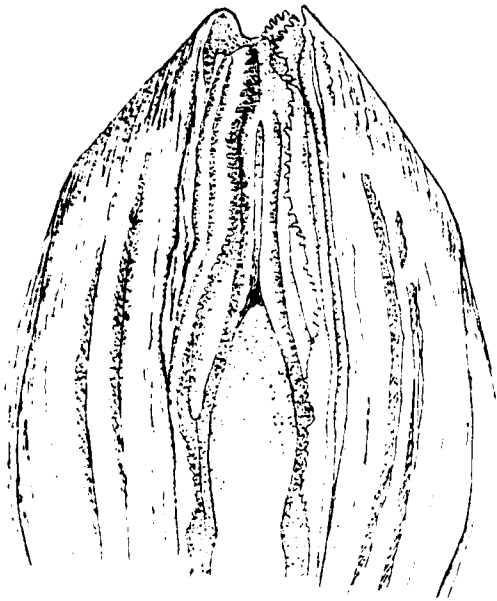


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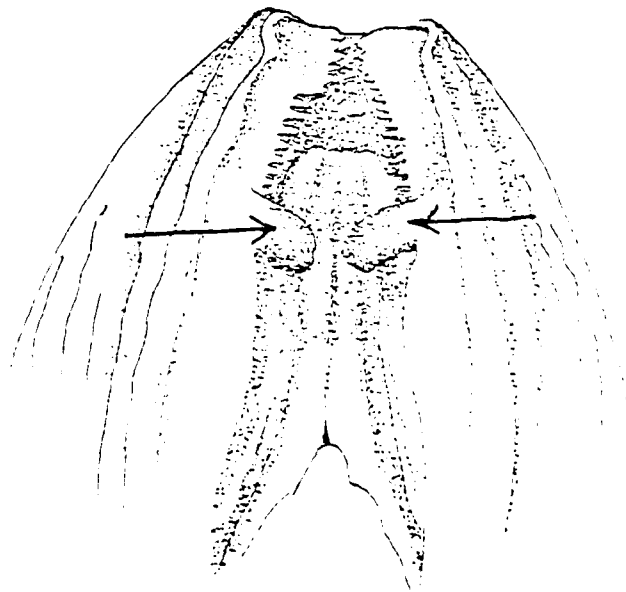


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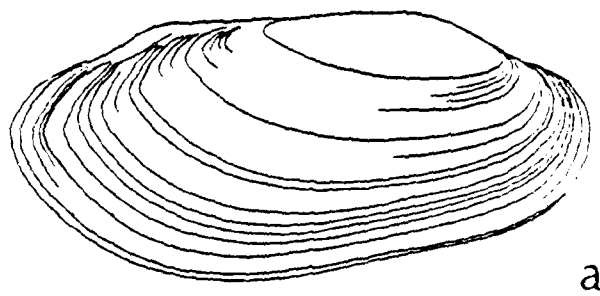
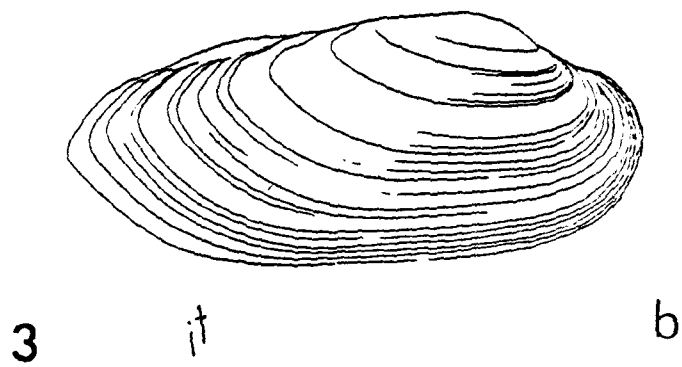
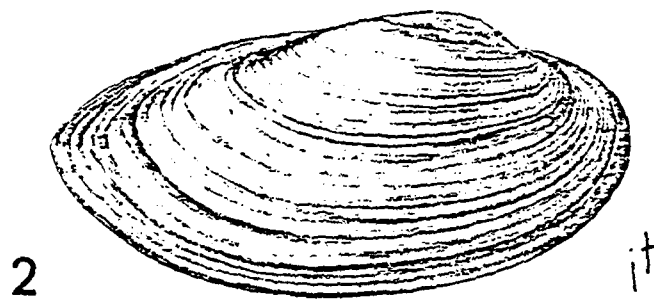
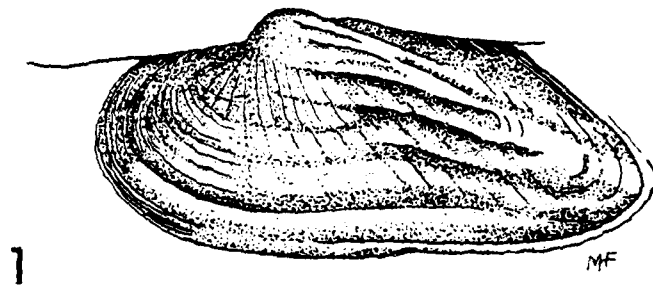


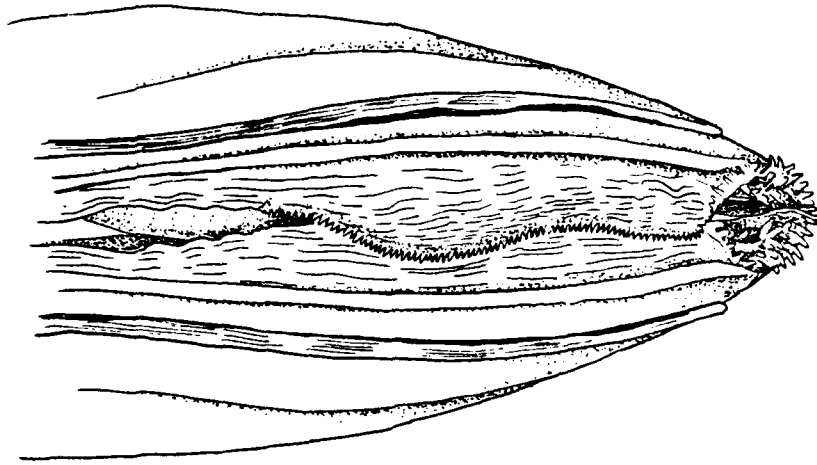
b

Exhibit 283

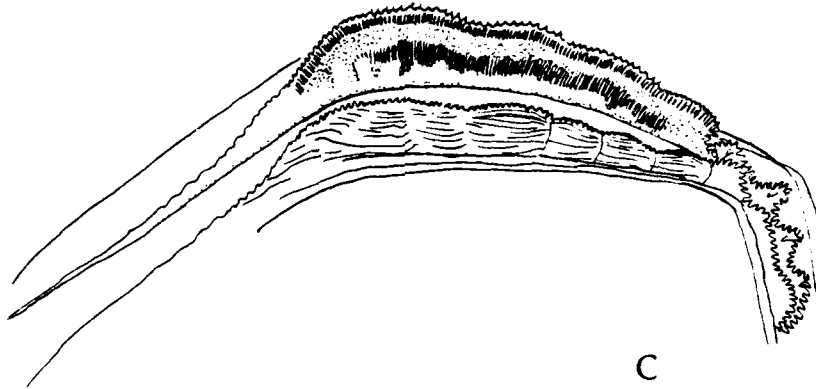
*Lampsilis teres* (Rafinesque), Yellow Sandshell

- Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.) Note beak sculpture, several nearly straight, sharp ridges oriented postbasal to the growth lines. Contrast this character-state to those in Figure 1 of Exhibits 282, 284, and 286, as examples.
- Figures 2. Lateral view of outer surface of right valve of male. (About 1.0x.) Contrast Figure 3a.
- Figure 3. Lateral view of outer surface of right valve of (a) female and (b) animal of undetermined sex. Note that sexual dimorphism in *L. teres* can be weakly expressed and that some individuals cannot be sexed on the basis of conchological features alone.
- Figure 4. Posterior end of female preserved in nearly lifelike aspect. (a,b) Ventral views. (c) Ventrolateral view. Note the variability of the mantle flaps.
- Figure 5. Left valve and mantle margin of female with emphasis upon outline. (a) Ventrolateral view. (b) Ventral view. Note the unusually great breadth of the postbasal mantle margin in this individual, and contrast its lack of pigmentation to the character-state in Figures 4b and c

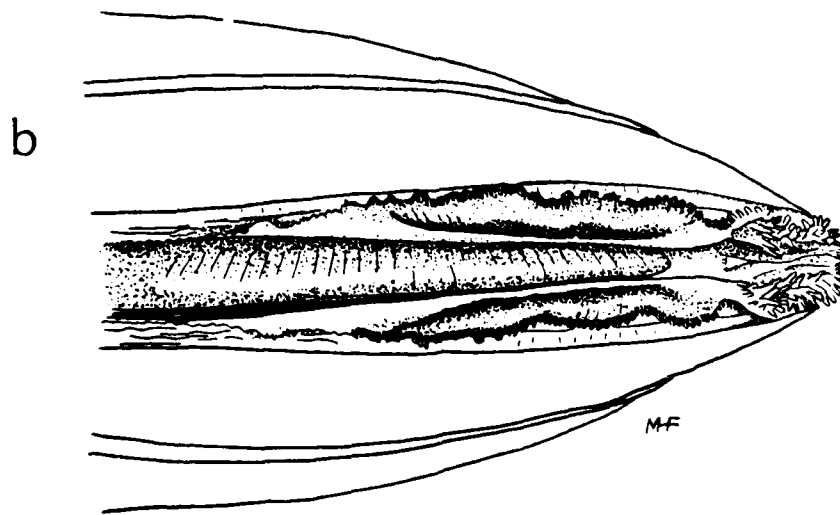




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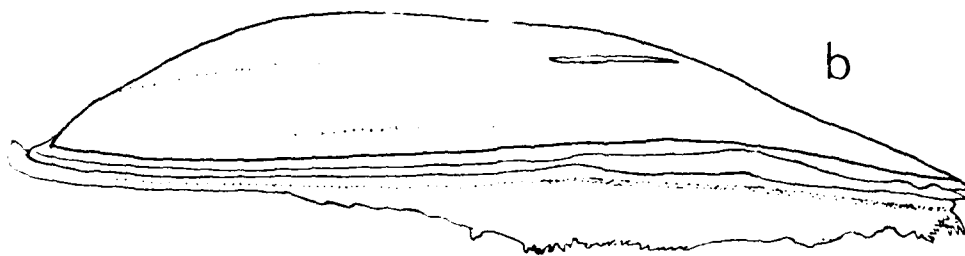
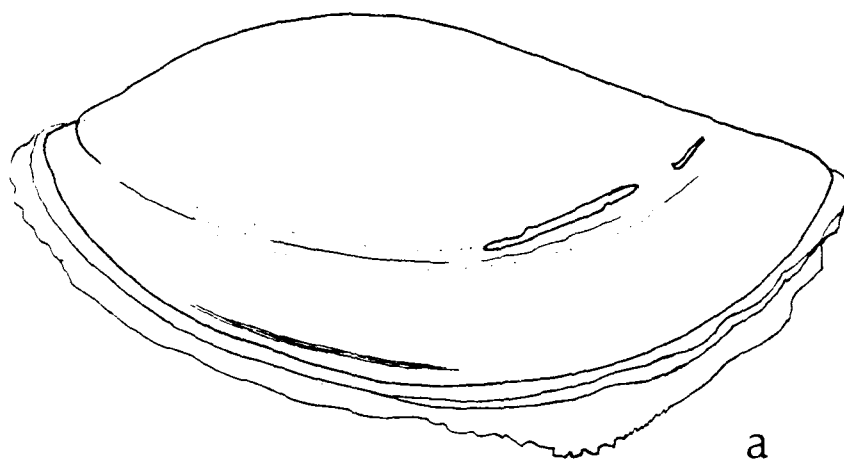


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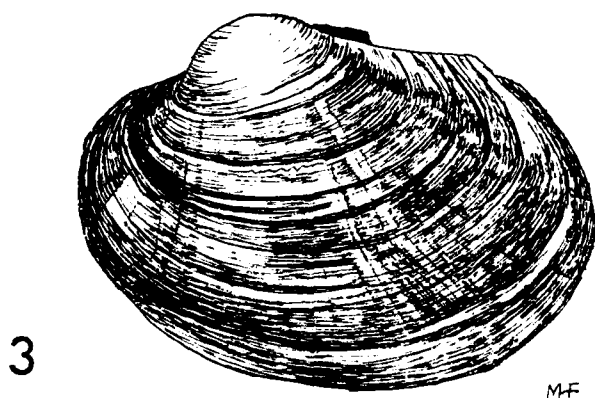
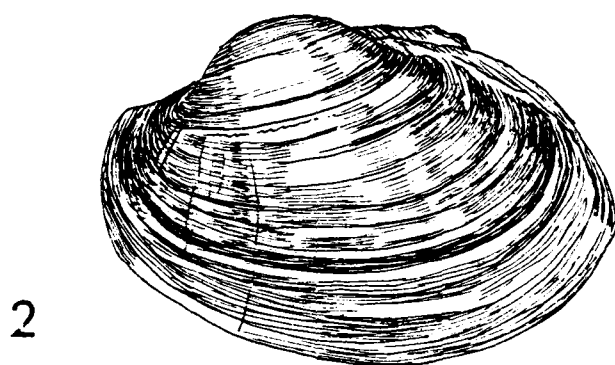
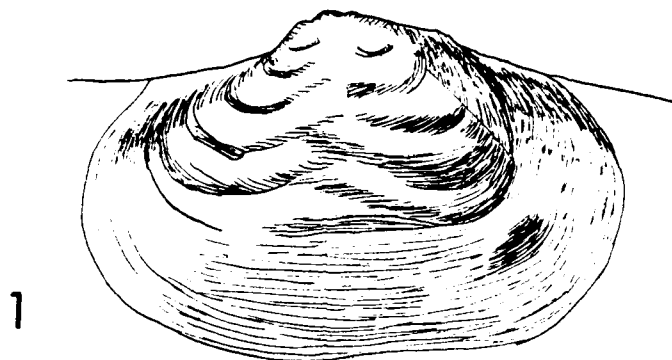
5

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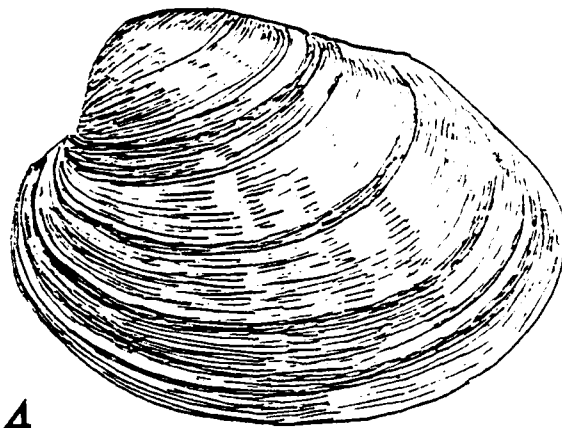
Exhibit 284

*Lampsilis higginsi* (Lea), Higgins' Eye

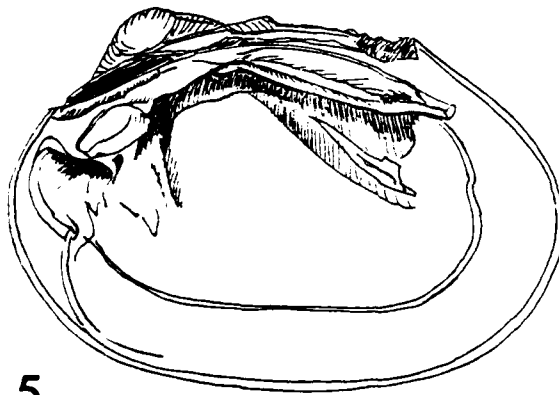
- Figure 1. Lateral view of outer surface of immediately post-glochidial growth of the left valve. (About 15.0x.) Note the beak sculpture, several interwoven ridges (compare Figure 1 in Exhibits 277, 278, 283, and 286).
- Figure 2. Lateral view of outer surface of left valve of young adult of undetermined sex. (About 1.0x.) Note the more or less radial distribution of pigment (green), which usually is lost in the mature adult.
- Figure 3. SAME, but probably a female: note that the posterior height is greater than that of the shell of almost equal length in Figure 2.
- Figure 4 and 7. Lateral view of outer surface of left valve of male. (About 1.0x.) Contrast to Exhibit 277, Figure 3.
- Figure 5 and 8. Lateral view of inner surface of right valve of male. (About 1.0x.) Contrast to Exhibit 277, Figure 4.
- Figure 6. Lateral view of hinge of right valve. (About 2.0x.) Note lamella (lower arrow) below lateral tooth (upper arrow), and compare with Exhibit 277, Figure 5.



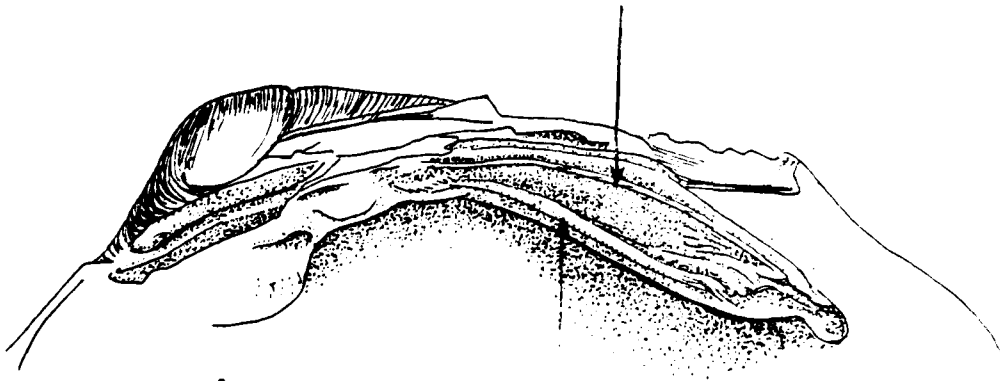
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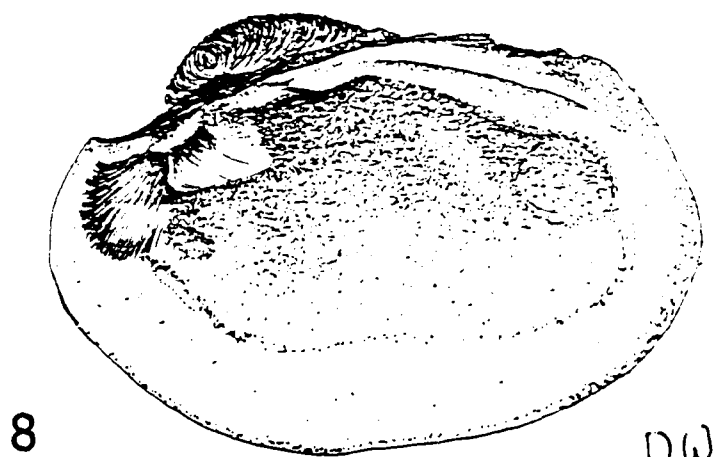
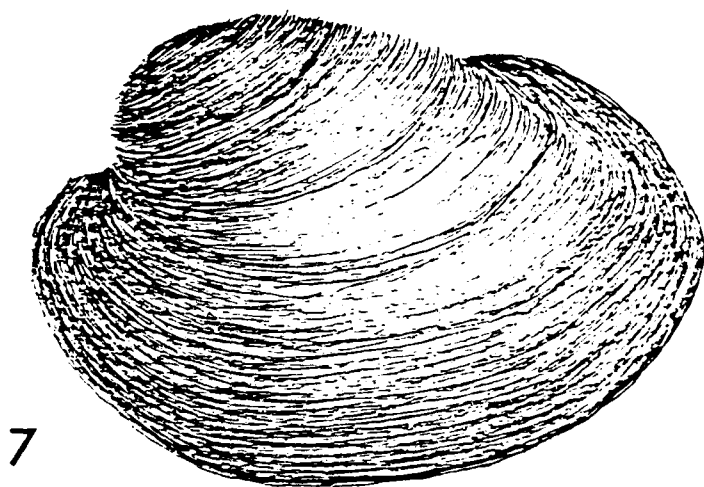


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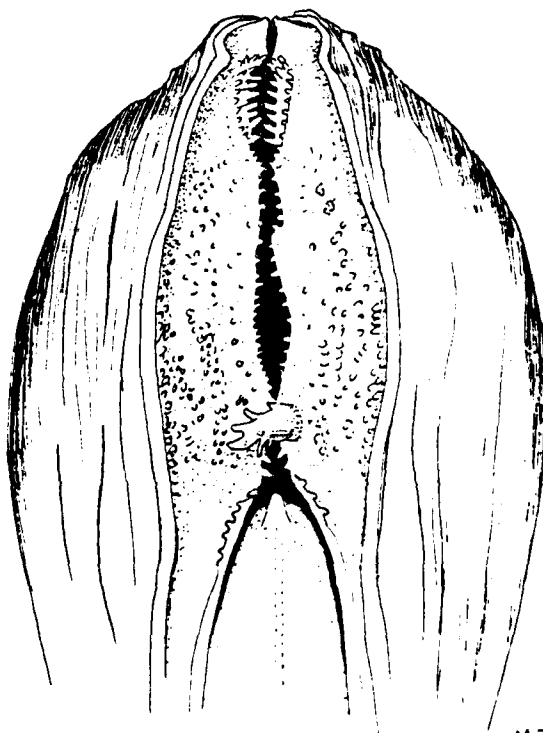
DW

Exhibit 285

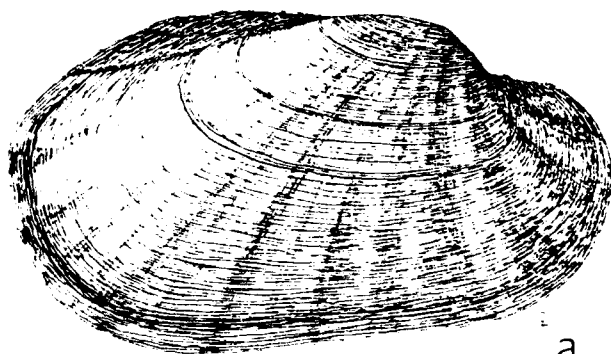
*Lampsilis radiata siliquoidea* (Barnes), Fat Mucket

Figure 1. Ventral view of posterior end of female. (About 2.0x.) Note papillae on outer surface (as well as margin) of mantle flap, plus ribbon-like part of flap (arrow).

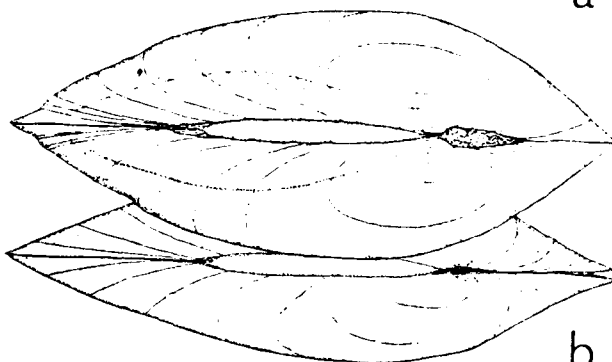
Figure 2. (a) Lateral view of outer surface of right valve of female. (About 1.0x.) (b) Dorsal view of female (upper) and male (lower). (About 1.0x.) (c) Lateral view of inner surface of left valve of female (behind) and male (before).



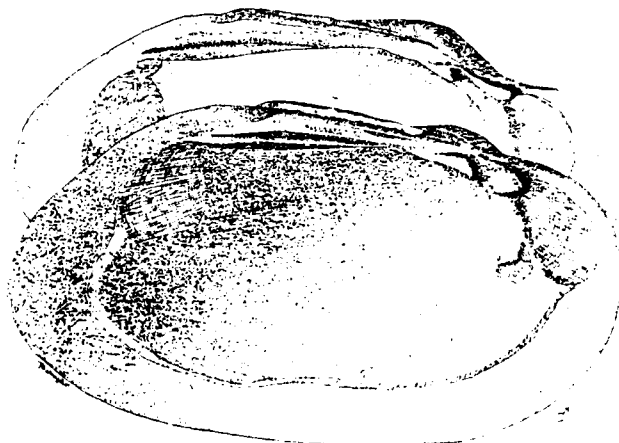
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Exhibit 286

*Lampsilis ovata ventricosa* (Barnes), Pocketbook

Figure 1. Juvenile. (a) Dorsal view. (About 4.0x.) (b) Lateral view of outer surface of left valve. (About 4.0x.) Note beak sculpture, several rounded concentric ridges, and contrast Figure 1 in Exhibits 283 and 284.

Figure 2. Lateral view of outer surface of right valve of female. (About 1.0x.) The male is much more pointed postbasally.

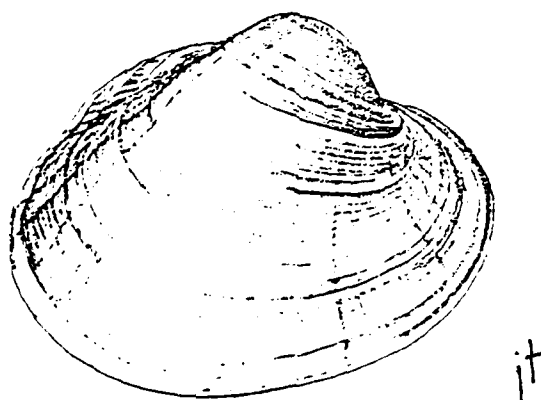
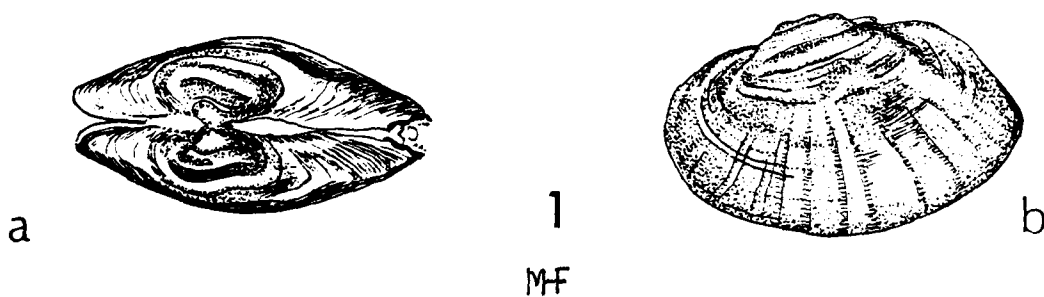




Exhibit 287

*Plagiola triquetra* (Rafinesque), Snuffbox

Figure 1. Lateral view of outer surface of right valve of male. (About 1.0x.) Note the strong radial ribs before and behind the posterior ridge.

Figure 2. SAME, but left valve of female.

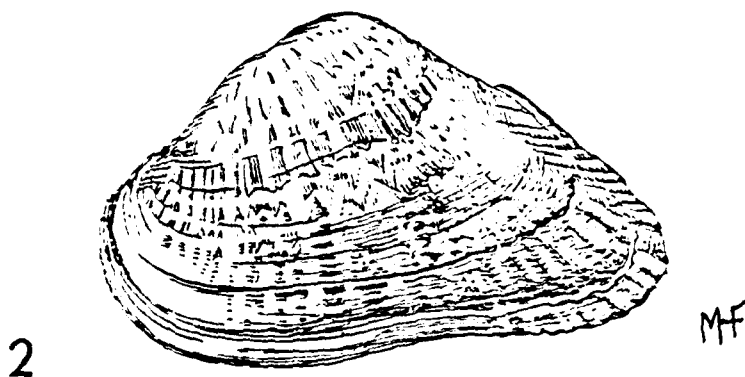
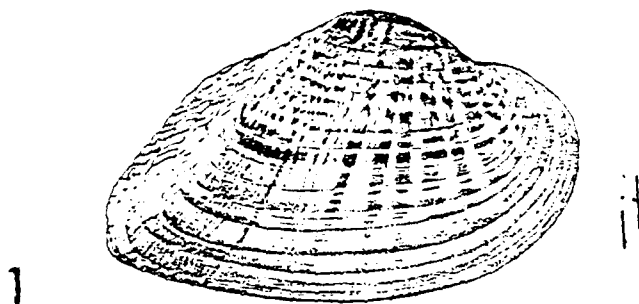
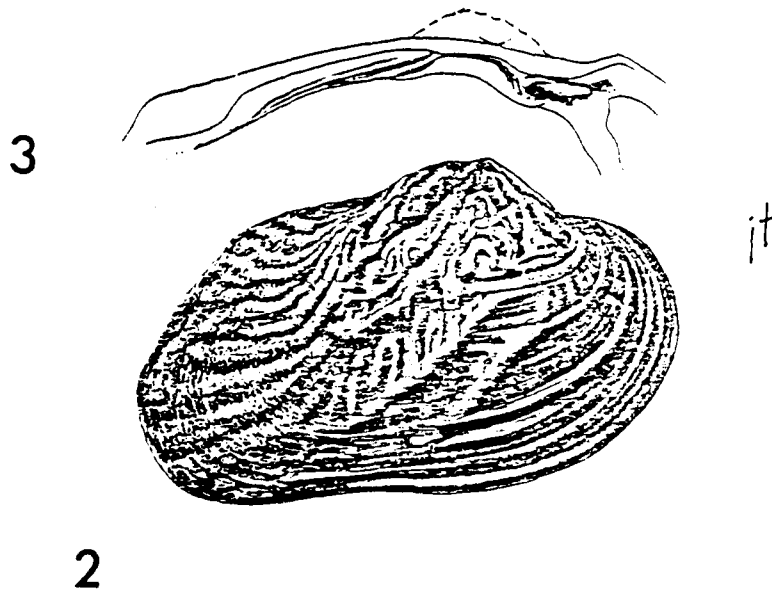
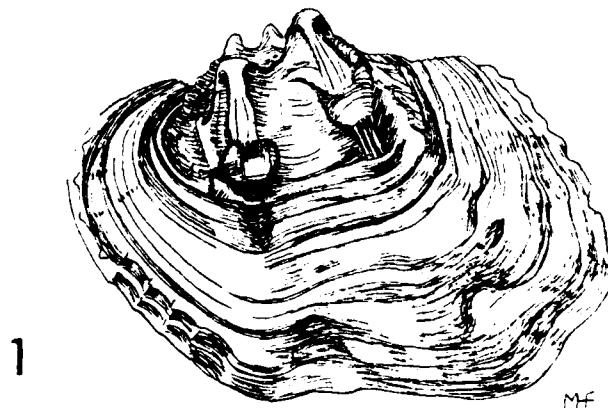


Exhibit 288

*Arcidens confragosus* (Say), Rockshell

- Figure 1. Lateral view of outer surface of left valve of juvenile. (About 4.0x.) Note beak sculpture, two divergent radial rows of tubercles.
- Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note spread of beak sculpture onto disc.
- Figure 3. Lateral view of hinge of left valve. (About 1.0x.) Note weak, but complete dentition.



2

Exhibit 289

*Lasmigona complanata* (Barnes), White Heelsplitter

Figure 1. (a) Lateral view of outer surface of left valve.  
(b) Dorsal view. (Both about 1.0x.) Note beak  
sculpture, double-looped and extending onto disc,  
and sculpted corrugations on posterior slope.

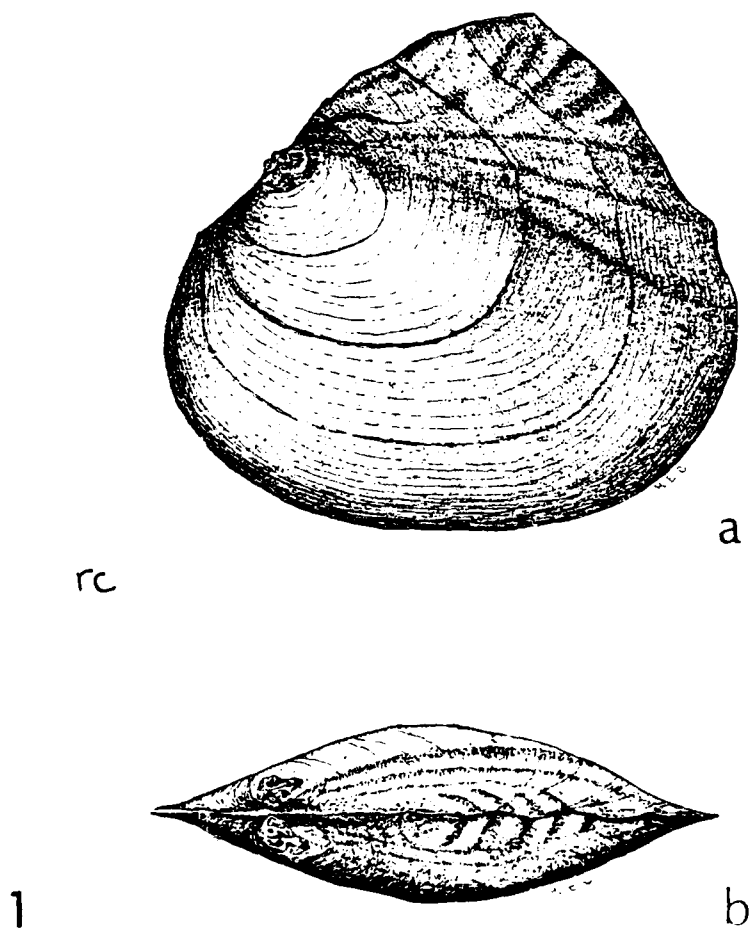


Exhibit 290

*Lasmigona costata* (Rafinesque), Fluted Shell

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note sculpture before and behind  
posterior ridge.

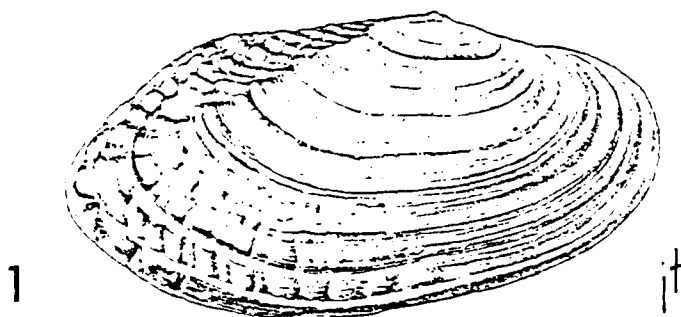


Exhibit 291

*Lasmigona compressa* (Lea), Creek Heelsplitter

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.)

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)  
Note complete, moderately well developed dentition.

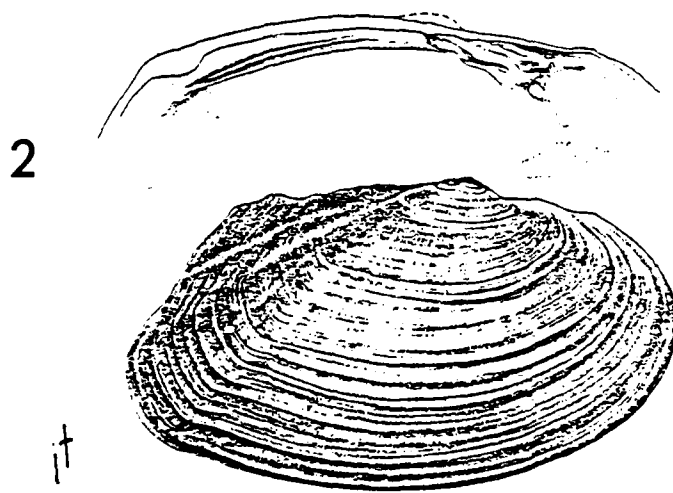


Exhibit 292

*Alasmidonta marginata* (Say), Elktoe

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.) Note sculpture on posterior slope.

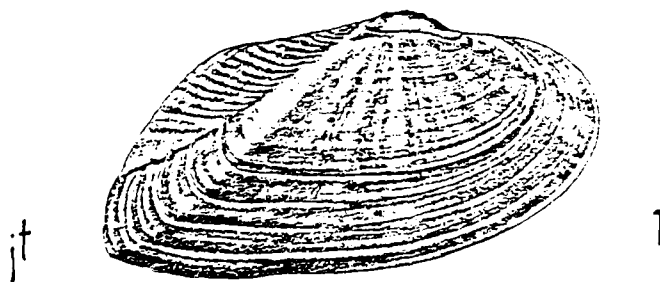


Exhibit 293

*Alasmodonta viridis* (Rafinesque), Slippershell

- Figure 1. Lateral view of outer surface of right valve.  
(About 1.5x.) Note conspicuous, undulating beak  
sculpture.
- Figure 2. Lateral view of hinge of left valve. (About 2.0x.)  
Note moderately well developed pseudocardinal teeth  
and weak lateral dentition.

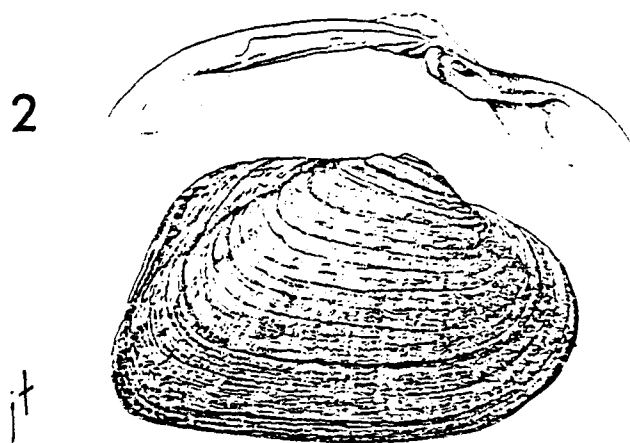




Exhibit 294

*Simpsoniconcha ambigua* (Say), Salamander Mussel

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.)

Figure 2. Lateral view of hinge of left valve. (About 1.0x.)

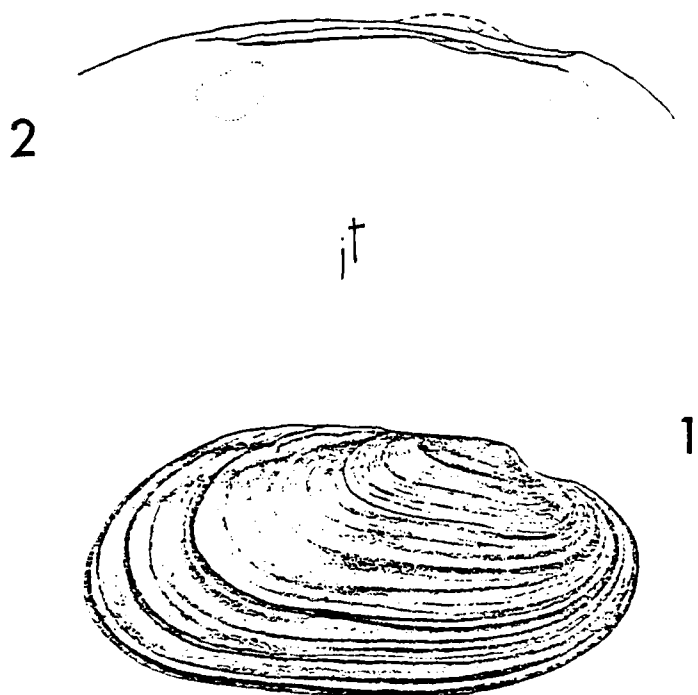


Exhibit 295

*Anodontoides ferussacianus* (Lea), Cylinder

Figure 1. Lateral view of outer surface of right valve.  
(About 1.0x.)

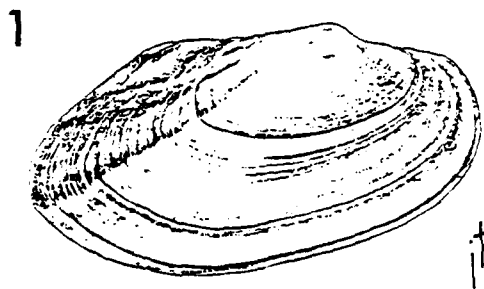


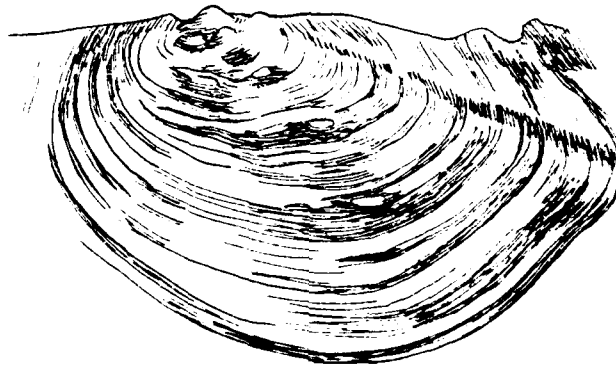
Exhibit 296

*Anodonta suborbiculata* (Say), Flat Floater

Figure 1. Lateral view of outer surface of immediately post-glochidial growth of left valve. (About 10.0x.)  
Note that the beak sculpture is confined to a weak (anterior) and a strong (posterior) row of tubercles.

Figure 2. Lateral view of outer surface of left valve.  
(About 1.0x.)

1



2

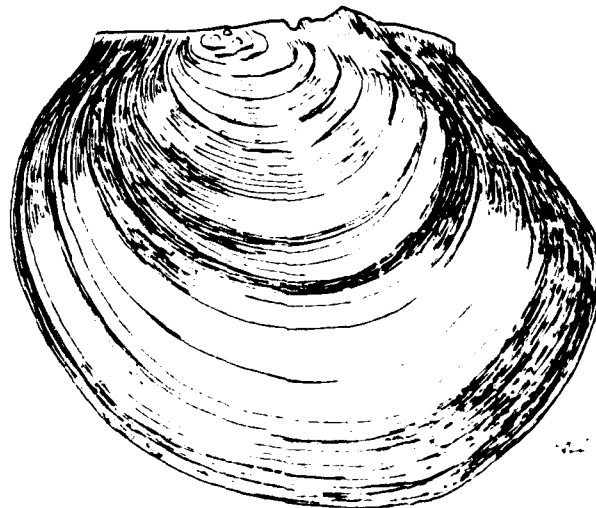


Exhibit 297

*Anodonta imbecillis* (Say), Paper Floater

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 5.0x.) Note beak sculpture, a few extremely weak ridges subparallel to the growth lines.

Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) Note nearly straight dorsal margin and low, laterally compressed umbo (arrow).

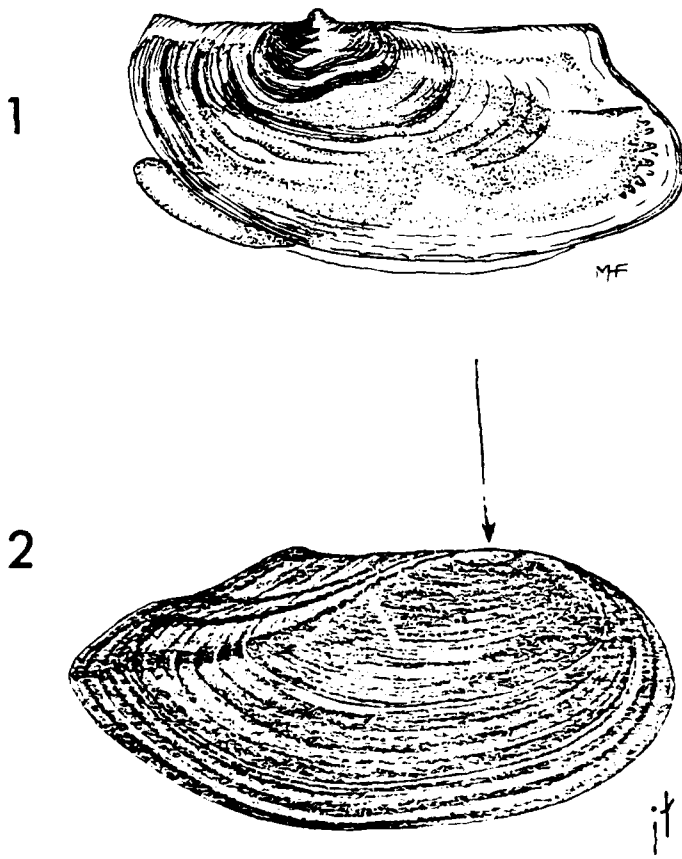
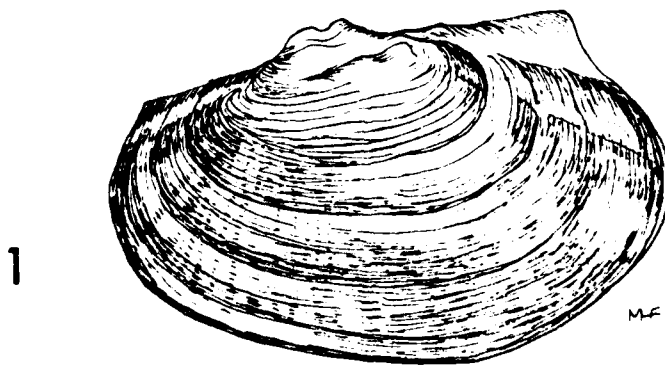


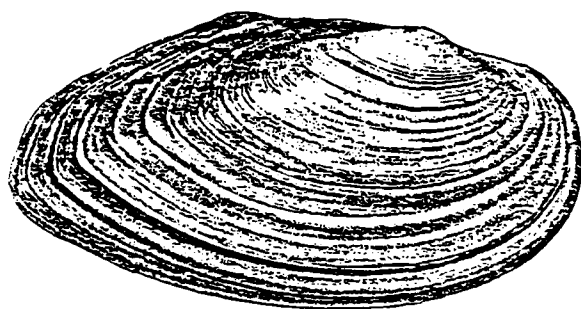
Exhibit 298

*Anodonta grandis* (Say), Giant Floater

Figure 1. Lateral view of outer surface of left valve of juvenile. (About 5.0x.) Note double-looped beak sculpture.

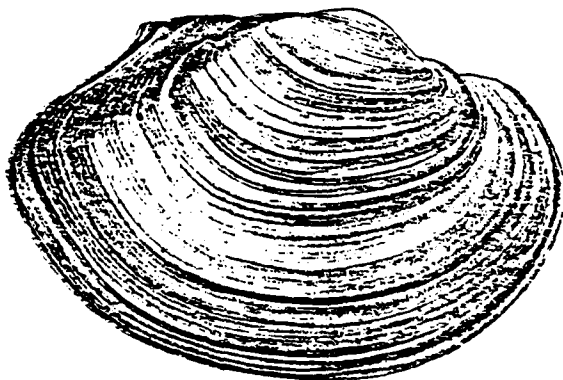
Figure 2. Lateral view of outer surface of right valve. (About 1.0x.) (a) Typical form. (b) Form sometimes called *A. g. corpulenta* (Cooper).





a

2



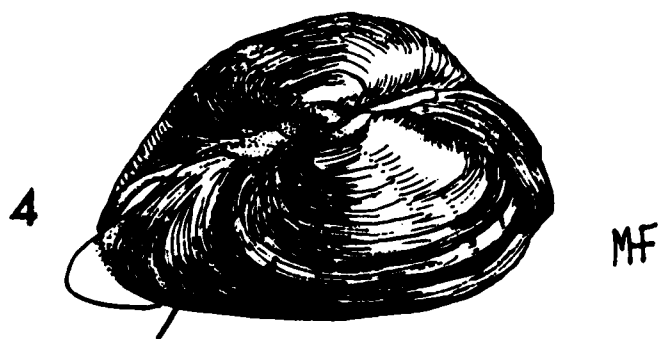
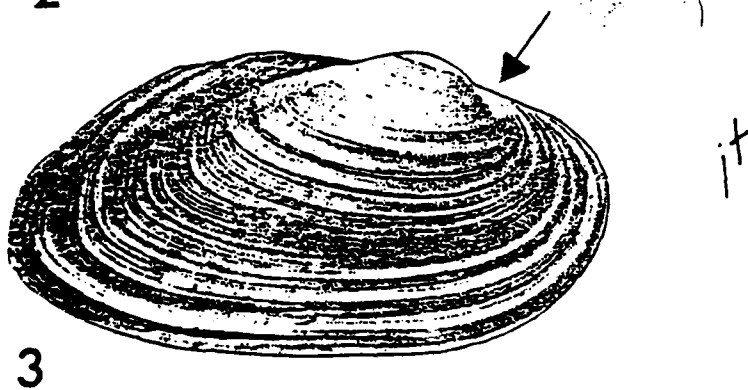
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Exhibit 299

*Strophitus undulatus* (Say), Strange Floater

- Figure 1. Dorsal view of left valve. (About 2.0x.) Note beak sculpture, several strong concentric ridges (see Figures 2 and 4).
- Figure 2. Lateral view of hinge of left valve. (About 1.5x.) Note weak dentition.
- Figure 3. Lateral view of outer surface of right valve. (About 1.0x.) The dorsal margin usually is much lower before (arrow) than behind the umbo, but this feature is poorly represented in this specimen, though it is somewhat apparent in Figure 4 (arrow).
- Figure 4. Anterodorsal view. (About 1.0x.)





## ADDITIONS AND CORRECTIONS

Page and, as useful, paragraph and line references are given. Enumeration of "paragraph" on a given page starts with the first complete or fractional paragraph on that page.

### Volume II

Page 3; pages 54-263:

The "master list" (Appendix A, Exhibit 1a) differs from the taxa portrayals in Appendix C (Exhibits 90-194) because of necessary changes that came to the Principal Investigator's attention after completion of the latter. (1) *Quadrula fragosa* was added to the list and does not appear in Exhibits 90-194. (2) "*Pleurobema cordatum*" was split into *P. rubrum* and *P. sintoria*. The latter two species replace "*P. cordatum*" on the list, but not in those Exhibits. (3) *Proptera capax* follows *P. purpurata* in Exhibit 1a; their order is reversed in Exhibits 90-194. In a very few instances these changes affect data portrayal in Appendix C. Such effects are discussed in footnotes to the corresponding Exhibits and/or in the Additions and Corrections section.

Pages 3-4:

Development of the Academy's "master list" of Recent UMR species-group naiad taxa required several stages. First, the relevant historical literature was compiled. Second, this literature was reviewed and evaluated in the light of modern taxonomic concepts. Third, several historical collections of mussel shells were examined. Fourth, the Principal Investigator made numerous easy decisions (and some very difficult ones) about which taxa were to be admitted to the list.

Most of the more important compilations of historical UMR mussel records date from the last century: Call (1885, 1895), Drew (1890), Garman (1888), Grant (1886, 1888), Holzinger (1888), Keyes (1888), Pratt (1876), Shimek (1888), Tryon (1865), and Witter (1883). Very few initial records of a mussel's UMR occurrence are not found among these papers. The rest of such records appear in certain Twentieth Century literature: Baker (1903, 1905), Chadwick (1906), Coker (1919), Dawley (1947), Fuller (1978b), Havlik and Stansbery (1978), Perry (1979), Shimek (1921), and Wilson and Danglade (1914). It is important to realize that all but a few of the historical records were established in the two earliest of these references, by Tryon

(1865) and Pratt (1876). Moreover, most of the records common to these two authors occur in Tryon. In other words, the overwhelming majority of taxon-specific naiad records already were historical more than a century ago.

Supplementary (and sometimes corroborative) information about UMR naiades, including some novel taxon-specific records, is provided in the accounts of the major relevant surveys of the past 50 years. These are the Grier (1922, 1926a) surveys in 1920 and 1925 for the then U.S. Bureau of Fisheries; the Ellis (1931a, 1931b) survey of 1930 and 1931, also for the Bureau; the Corps-Academy survey of 1977 through 1979, recorded by Fuller (1978b) and in this report; and the WDNR survey in 1977 through 1980, whose cumulative report is in preparation.

In addition to drawing upon the holdings of major institutions (e.g., ANSP and OSU), the Principal Investigator visited the Pratt collection at the Putman Museum in Davenport, Iowa, and the Shimek collection in the Museum of Natural History at the University of Iowa, Iowa City. (The assistance of Carol Hunt and George D. Schrimper of the respective staffs is gratefully acknowledged.) These two examinations permitted evaluation of most of the equivocal records in both Pratt (1876) and Shimek (1888).

Finally, the numerous personal communications of David H. Stansbery (OSU) refined the Principal Investigator's sense of certain other taxa to such a point that the "master list" (Exhibit 1a) now stands at 50.

Page 3:

Any mention of Pleurobemini or Unionini in the report should read "Elliptionini".

As Fuller (1978b) stated:

There is no evidence sufficient to support or refute addition of the enigmatic *Cokeria southalli* to a list of upper Mississippi basin naiades. Marshall (1916) based this taxon on a single, possibly deformed specimen that had been first described by Coker and Southall (1915)\*. This shell resembles F.C. Baker's (1928) illustrations of some apparently teratological *Amblema plicata*. The soft-tissue morphology of *C. southalli* is unknown; its conchology suggests ascription to the Amblemini. The illustration by Coker and Southall was repeated by Marshall.

\*Coker, R.E., and Southall, J.B. 1915. Mussel resources in tributaries of the Upper Missouri River. Report of the United States Commissioner of Fisheries for 1914, Appendix 4:1-17. Separately issued as Bureau of Fisheries Document No. 812.

Pages 5-6:

The decision to admit a "master list" of UMR mussel host fishes to Appendix A was made after the other appendical materials were completed. This accounts for the splitting of "Exhibit 1" of the Draft Preliminary Report into Exhibits 1a and 1b of the Final Report.

Page 6:

Below *Fundulus zebrinus*, insert:

Family Poeciliidae  
*Gambusia affinis* (Baird and Girard), Mosquitofish

Below *Lepomis macrochirus* insert:

*Lepomis marginatus* (Holbrook), Dollar Sunfish

Page 7:

The grand total square footage that was brailed during this project's three seasons is 13,265,000. Seemingly astronomical, this figure actually amounts to slightly less than only one half (0.48) of a square mile. The admittedly adverse environmental impact of the survey (i.e., the death of over 10,000 living mussels), as opposed to its long-term benefit in advising Corps O & M activities, thus was limited to a fraction of 1% of the possible study area. It is encouraging that so much insight (into the UMR mussel fauna) cost so little damage. A critic might assert, on the other hand, that too little area was surveyed. He must realize that the purposeful restriction of the area to O & M sites of high potential damage to benthos was environmentally beneficial and unavoidably limited the scope of the riverbed actually surveyed.

These remarks might seem disclamatory and apologetic were it not for the fact that the goals, results, and interpretations of this survey have already begun to be misunderstood; there are five parties that have been instrumental to the project (ANSP, USACE, USEWS, UWLC, and WDNR), and none of them deserves to be wrongly criticized as a result of supporting that effort. One example of such misunderstanding appears in a recent article\* suggesting that *Lamprolaima higginsii* should not be on the Endangered species list. The suggestion is based in part on a misrepresentation of information imputed to the Principal Investigator, but drawn from an article that he did not write.

\*Johnson, R.I. Zoogeography of North American Unionacea (Mollusca: Bivalvia) north of the maximum Pleistocene glaciation. Bulletin of the Museum of Comparative Zoology, 149:77-189 (1980).

Pages 8-51:

"RM" is an abbreviation of "river mile(s)".

The compass points used in the geographic data portrayals conform to the following legend.

|                 |                        |
|-----------------|------------------------|
| E -- east       | SE -- southeast        |
| N -- north      | SSE -- south-southeast |
| NE -- northeast | SW -- southwest        |
| NW -- northwest | W -- west              |
| S -- south      | WNW -- west-northwest  |

The hyphen (-) equals "by"; e.g., SSE is "south-southeast" or "south by southeast".

Page 28, Exhibit 43:

The synopsis of brail runs is omitted because none was made.

Page 48, Exhibit 82:

The synopsis of brail runs is omitted because none was recorded (see discussion of the Mississippi Gardens Site in the text).

Page 49, Exhibit 84:

The synopsis of brail runs is omitted because, although it was attempted, brailing the river bed was impossible on account of heavy submerged vegetation. Brailing was not unproductive, however, because on the vegetation entangled in the chains and hooks there were numerous juvenile mussels.

Page 52:

The rapidly growing value of zooarchaeology (the science or study of animals as a factor in archaeology) and ethnomalacology in characterizing the prehistoric mussel fauna is exemplified by the following, recent paper: Parmalee, P.W., W.E. Klippel, and A.E. Bogan, 1980. Notes on the prehistoric and present status of the naiad fauna of the middle Cumberland River, Smith County, Tennessee. Nautilus, 94:93-105.

Pages 174-175:

The Dakota and Winters Landing Sites in Pool 6 were cursorily surveyed in 1977. Few mussels were found at the former Site; at the latter, none (Fuller, 1977).

Page 273:

For "FRIDLE" read "FRIDLEY".

Page 282:

For "VICTOR" read "VICTORY"; for "DE SOTO" read "DESOTO".

Page 283:

For "PRAIRIE du CHIEN" read "PRAIRIE DU CHIEN".

Page 284, paragraph 3, lines 14-15:

For "Hudson Railroad Bridge" read "Hudson".

Page 284, paragraph 3, lines 18-21:

Inadvertently omitted is mention of the remnant bed off Wabasha, Minnesota.

Page 289:

The formal limits of the Kinnickinnic Site are shown. Brailing was conducted as far upstream as the mouth of the Kinnickinnic River.

Page 316:

The Brownsville Site includes the major side channel opening to the right at about RM 687.7. Brailing continued down this channel as far as the stump field.

Page 320 (and elsewhere in this report):

The correct rendering is "DeSoto", not "De Soto", according to the United States Postal Service, regardless of representations to the contrary on Corps Navigation Charts and other documents.

Page 324:

The Hay Point Bank Repair Site includes McDonald Slough downstream to the latitude of the lower limit of the Site in the main channel.

Page 328:

The McMillan Island Site includes the side channel that opens at the head of McMillan Island itself. Brailing was conducted down this channel until the water became prohibitively shallow.

Page 330 (and elsewhere in this report):

Note that Recent (as oposed to "recent") means the period of geological time since Wisconsin (i.e., the last Pleistocene) glaciation (i.e., about the last 10,000 years).

Page 333, paragraph 1, line 7:

Tetragenous and homogenous marsupia are difficult to recognize as such because, even when fully charged, most swell very little and thus resemble uncharged demibranchs. When marsupia are empty, their only identifying features often are microscopic and impossible to examine without destroying the animal.

Page 334, paragraph 2, lines 10-12:

In many Lampsilini (Exhibit 1a) the glochidia are discharged through the marsupial walls, not dorsad through the water tubes and then the excurrent aperture.

Page 336, paragraph 4:

Radial tubercles "along" a ridge do not necessarily run along its apical surface.

Page 337-338:

If all figures on a page are by one artist, his or her logo appears there only once.

Page 337:

The following remarks should appear after the discussion of sculpture.

Not to be confused with sculpture in the strict sense are the growth rings (or lines or recesses), which mark periods when no new shell material was deposited by the mantle margin. Such periods of dormancy are induced by low water temperature (as in winter), deprivation (as poor food supply), etc. The annual (i.e., winter) growth rests ordinarily are very prominent. The number of annual rings is a reliable approximation of the animal's age in years.

Shape often is almost as valuable a discriminant as sculpture. Unless otherwise indicated, descriptives of shell shape are used in the Key with reference to the shell as seen from the side (i.e., in lateral view). The descriptives include elongate, terete, circular, rectangular, oblique, alate, angular, and quadrate. Some of these expressions deserve definition here. An elongate shell is conspicuously longer than high. A terete

shell tapers and is subcircular in transverse section. An oblique shell is skewed, much as a scalene triangle. An alate shell has one ala or two alae ("wings") on the dorsal margin. Note that the prefix "sub" (similar to, approximately) often is applied to these descriptives. A quadrate shell is subsquare.

In dorsal view (i.e., as seen from above), a compressed shell is narrow (and often flattened) from side to side, and an inflated one is comparatively broad and rounded.

Page 337, paragraph 4, line 1:

For "Mary Fuges" read "Mary H. Fuges". Realizing this makes her logo (MF) more understandable.

Page 339, paragraph 9:

See Buchanan (1979a) for another good discussion of *Lampsilis higginsii*. It includes D.H. Stansbery's (OSU) rationale for considering Higgins' Eye endemic to the UMR.

Page 340 (and elsewhere in this report):

For "Pennak (1953)" read "Pennak (1953, 1978)".

Page 341:

*Lasmigona costata* appears in couplet-choice 40a.

Page 342, paragraph 1, lines 1-2:

Neel (1941) published another figure of putative *Quadrula fragosa*, but even he questioned its identity.

Page 342, paragraph 2:

Note that *Pleurobema sintoxia* keys out with *P. rubrum*.

Page 342, paragraph 3, Figure 6 caption:

Marsupial demibranchs (which occur only in females and some hermaphrodites) are compartmentalized into columnar passages (the water-tubes). Water flows along these passages through the gill, thus permitting effective gas exchange. The water tubes are separated by partitions (the septa; singular: septum), which provide "endoskeletal" support for the gill. The septa in a marsupium are about twice as thick and closely spaced as those in a non-marsupial demibranch or portion thereof. Thus is provided added support for the marsupium and its contents (ova and/or glochidia). In an homogenous mussel, for example,

the septa of the inner, non-marsupial, "male" demibranch of the female are set about twice as far apart as are those of the outer, marsupial, "female" demibranch.

Page 344:

Naiad soft-tissue anatomy is in essence a simple subject, which has not been succinctly expounded. There simply is no good, single, published guide. Burch's (1973, 1975) works are rather readily available and helpful.

Pages 349-354:

A couplet-choice number in parentheses following an initial couplet-choice number (e.g., "1b" in "12a (1b)") identifies the antecedent of the given couplet; in other words, having made the choice 1b in couplet 1, the user of the taxonomic key is directed to couplet 12, where he must make another choice (either 12a or 12b), etc.

"X" (as in "2.0x") means "times natural size" (as in "two times natural size").

Page 351, couplet-choice 24b:

The female *Ellipsaria lineolata* is laterally (i.e., from side to side) inflated (i.e., broadened, swollen) in comparison to the male, which is laterally compressed (i.e., flattened). The difference is conspicuous.

Page 374, Figure 2 caption:

For "umbonal in character" read "neoteinic".

Page 381, Figure 2 caption:

"Apapillose" means "without papillae".

Page 395, Figure 1 caption:

"Rostrate" means "beak-like".

Page 395, Figure 5; page 409, Figure 6:

Both *Obovaria olivaria* and *Lampsilis higginsii* can exhibit a lamella (i.e., shelf-like process, in this case) on the hinge plate below the lateral tooth of the right shell valve. This confounds the claim that the presence/absence of this



lamella is a reliable conchological discriminant between these two species.

Page 403, Figure 2 caption:

"Postbasal" means "toward the postbasal (margin)".

Page 403, Figure 4 caption:

"Anteriad" means "toward the anterior (margin)".

Page 430, Figure 4 caption:

"Anterodorsal", in this instance, refers to a view of the specimen from both in front of and above it. The view of this specimen that is depicted is not perfectly anterodorsal, because the animal is tilted laterad (i.e., to the side).

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